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MAGAZINE

VOLUME 6 NUMBER 3  
FEBRUARY 10, 1987**TWO CLASSIC PROGRAMS FREE!**

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*Special Report:*  
**Desktop Publishing***Hands-on Reviews:*

- PageMaker—  
PC versus Mac
- PFS:ClickArt
- Personal Publisher
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Publisher
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- Inequality solutions

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- Interest Rate/Present Value calculations
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# AST TurboLaser™

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the runway.



AST's TurboLaser has it all. The best combination of high-speed, sharp graphics, typeset-quality text and unlimited software compatibility on the market. Printed in a moment's notice, newsletters, charts, letters, drawings, reports, forms, manuals and more, never looked more professional. Judge for yourself — feature-for-feature AST's desktop laser printer writes off the competition.

## TurboLaser Versus LaserJet Desktop Laser Printer Comparison

Feature	AST TurboLaser	HP LaserJet	HP LaserJet PLUS	HP LaserJet 500 PLUS
Original Pages per Minute Speed (text and graphics)	8	<8	<8	<8
Full Page 300 dpi Graphics	Yes	No	No	No
HPGL Graphics Compatibility	Yes	No	No	No
1.5 MB RAM	Yes	No	No	No
Built-In Rasterizer (RIP)	Yes	No	No	No
Wide Variety of Standard Fonts, Styles and Sizes (resident and instantly accessible)	Yes	No	No	No
Wide Range of International Fonts	Yes	?	?	?
Built-in Page Description Package	Yes	No	No	No
Standard Serial and Parallel Interface Support	Yes	No	No	Yes
Input Tray Capacity (pages)	250	100	100	500
Output Tray Capacity (pages)	250	20	20	500
Collated Face-Down Output	Yes	No	No	Yes
Diablo 630 Emulation	Yes	Yes	Yes	Yes
Epson Emulation	Yes	Yes	Yes	Yes
Monthly Duty Rating (pages)	5K-10K	2-3K	2-3K	2-3K
Life Expectancy (pages)	600K	100K	100K	100K
Fully Compatible With All AST Products:	Yes	?	?	?

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Monthly Interest	\$100	\$95	\$90	\$85	\$80	\$75	\$70	\$65	\$60	\$55	\$50	\$45
Monthly Principal	\$900	\$855	\$810	\$765	\$720	\$675	\$630	\$585	\$540	\$495	\$450	\$405
Unpaid Balance	\$10,000	\$9,050	\$8,100	\$7,150	\$6,200	\$5,250	\$4,300	\$3,350	\$2,400	\$1,450	\$500	\$50
Interest Paid	\$1,000	\$950	\$900	\$850	\$800	\$750	\$700	\$650	\$600	\$550	\$500	\$450
Principal Paid	\$900	\$855	\$810	\$765	\$720	\$675	\$630	\$585	\$540	\$495	\$450	\$405
Unpaid Balance	\$10,000	\$9,050	\$8,100	\$7,150	\$6,200	\$5,250	\$4,300	\$3,350	\$2,400	\$1,450	\$500	\$50



AST prints originals at the rate most laser printers can only produce additional copies. Other desktop models boast eight-pages-per-minute, but are referring to the time it takes to make copies of an original. Printing eight-ORIGINAL-pages-per-minute, TurboLaser obsoletes the "pages-per-minute" standard.

**Full-Page, High-Resolution Graphics.** Complete 8½" x 11"-page graphics with 300 dpi (dots per inch) resolution makes TurboLaser an ideal business graphics and CAD/CAM presentation tool. The competition is confined to small "token" graphics output.



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WordStar, dBASE, Chart, Word, etc., and CAD/CAM graphics such as AutoCAD, CADVANCE, VersaCAD and many others.

**Multiple Fonts, Styles and Sizes.** Perfect for desktop publishing, TurboLaser provides a wide variety of fonts, type styles and point sizes for versatile and creative communications.

**Sophisticated Paper Handling.** Run large print jobs unattended with TurboLaser's large input and output trays. And face-down output reduces collating time, so you can produce reports on the run.

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### A Few of the Standard Fonts:

LETGTH	ABCEDEFGHIJKLMNOPabcde fgh i j k l m n o p 123
LETGTH	ABCEDEFGHIJKLMNOPabcde fgh i j k l m n o p 123
LETGTH	ABCEDEFGHIJKLMNOPabcde fgh i j k l m n o p 123
COURIER	ABCEDEFGHIJKLMNOPabcde fgh i j k l m n o p 123
COURIER	ABCEDEFGHIJKLMNOPabcde fgh i j k l m n o p 123
COURIER	ABCEDEFGHIJKLMNOPabcde fgh i j k l m n o p 123
DUTLH	ABCEDEFGHIJKLMNOPabcde fgh i j k l m n o p 123
DUTLH	ABCEDEFGHIJKLMNOPabcde fgh i j k l m n o p 123
DUTLH	ABCEDEFGHIJKLMNOPabcde fgh i j k l m n o p 123
SWISS	ABCEDEFGHIJKLMNOPabcde fgh i j k l m n o p 123
SWISS	ABCEDEFGHIJKLMNOPabcde fgh i j k l m n o p 123
SWISS	ABCEDEFGHIJKLMNOPabcde fgh i j k l m n o p 123

[illegible]**AST** RESEARCH INC.

Yes, I want more information about AST's Turbolaser.

☐ Reseller ☐ End User ☐ Desktop Publishing ☐ CAD/CAM ☐ Business Graphics

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Company \_\_\_\_\_

### Acknowledgements

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Photo \_\_\_\_\_

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## COVER STORY

## Desktop Publishing Without Hype

**Stewart Alsop/**Everyone has questions about desktop publishing. What is it? Who is it for? How much does it cost? What are its capabilities? Is it a fad or is it the future? Here, finally, are the answers .... 110

**Muscling In on the Mac:  
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Diane Burns and S. Venit/PC-based page composition (desktop publishing) software is staking out the turf controlled by the Macintosh and PageMaker. Challengers to the Mac include PFS:ClickArt Personal Publisher, FrontPage, Harvard Professional Publisher, PageMaker (PC Version), and Ventura Publisher ..... 119



*Venue Publisher shows off, page 119.*

ENVIRONMENTAL PERFORMANCE							
Company	Carbon Footprint	Renewable Energy	Waste Recycling	Water Conservation	Employee Sustainability	Community Engagement	Overall Score
<b>COMPANY A - LEADER</b>							
Company A	100	95	90	85	92	88	90
Company B	85	80	75	70	82	78	78
Company C	70	65	60	55	68	62	65
Company D	55	50	45	40	52	48	50
Company E	40	35	30	25	38	32	35
Company F	25	20	15	10	22	18	20
Company G	10	5	0	0	8	3	10
<b>COMPANY H - IMPROVING</b>							
Company H	60	55	50	45	58	52	55
Company I	45	40	35	30	42	38	40
Company J	30	25	20	15	28	22	25
Company K	15	10	5	0	12	8	10
Company L	5	0	0	0	2	0	5
<b>COMPANY M - CHALLENGING</b>							
Company M	90	85	80	75	88	82	85
Company N	75	70	65	60	72	68	70
Company O	60	55	50	45	58	52	55
Company P	45	40	35	30	42	38	40
Company Q	30	25	20	15	28	22	25
Company R	15	10	5	0	12	8	10
Company S	5	0	0	0	2	0	5

**Stacking Up to the Mac**  
*Diane Burris and S. Venit/A*  
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*Frank J. Derfler, Jr./Fox Research's networking package supplies everything to start a network. Is this one-stop shopping feature enough to merit your investment? .... 223*

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*Joe Deposito, Vincent Puglia,*  
*and Charles Teets/*These nine  
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surprisingly impressive  
features and subtle rewards at  
discount prices. We review  
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Roberto Brosan

# WHAT'S INSIDE



Editorial assistant Donald P. Willmott

Zealots would have us believe that full-blown PC-based desktop publishing is here at last. But according to West Coast editor Stewart Alsop, the truth is more sobering.

It's easy to be taken in by all the manufacturers' hoopla that promises that a few simple programs and a laser printer can replace your whole art department. Ads scream how easy it is, and we've all been impressed by what the Macintosh can produce on an Apple LaserWriter—even though it could take hours to produce an elegant one-page memo.

Editor Bill Machrone has stressed to the entire staff that for *PC Magazine* a product is not real until it's on dealers' shelves. We don't deal in rumors or vicious gossip (excepting John C. Dvorak). However, it's our policy to bring you the fastest hands-on reviews of the hottest new products and emerging technologies. So in this issue we stretched Machrone's rule to preview two of the PC industry's most-talked-about programs—*Harvard Professional Publisher* and *PageMaker*.

Computer experts Diane Burns and S. Venit, who run a thriving San Francisco desktop publishing firm, reviewed these PC offerings to see how they stacked up against the Mac. Their conclusion: the capability exists if you want to pay for it, but it's still tough to beat the Mac—today. The reviews for these and three other WYSIWYG page composition packages, *FrontPage*, *PFS:Click-Art Personal Publisher*, and *Ventura Publisher*, start on page 119.

In the tradition of *PC Magazine* torture testing, we assigned editorial assistant Donald P. Willmott the task of concocting a sample newsletter that would push these programs to their limit. Willmott is no stranger to designing layouts, having spent several harried semesters at the helm of Bowdoin College's newspaper, *The Orient*. He added a personal touch by endowing all the fictitious employees in our newsletter with the names of his college friends.

Alsop sums it up best by admitting that, while the results can be impressive, there are still a few wrinkles in the desktop publishing process. For one thing, it helps if the basic \$500 program is connected to a high-speed copier. Unfortunately, the copier of choice will set you back \$20,000. Far more affordable is the newest crop of AT work-alikes, starting on page 241. Also in this issue, contributing editor Winn L. Rosch puts hard disk cards in perspective, page 195.

Even if you've never typed in a program listing, you should check out the Productivity section in this issue. We've figured out a way to tame DOS so that it performs some genuine miracles; see pages 299 and 323.

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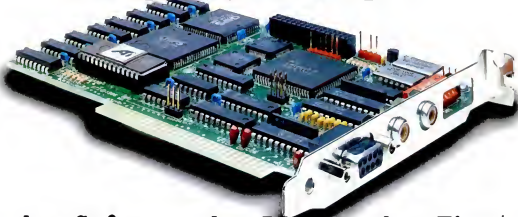
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Automatic Switching Between EGA and CGA Color Modes and Among EGA, MDA, and Hercules Modes	✓	✓	✓
Runs EGA, CGA, MDA, Hercules and 132 Columns on an EGA Monitor	✓	✓	✓
Runs EGA, CGA, MDA, Hercules and 132 Columns on an RGB Color Monitor	✓	✓	✓
Runs EGA, CGA, MDA, Hercules and 132 Columns on a TTL Monochrome Monitor	✓	✓	✓
Runs EGA, CGA, MDA, Hercules and 132 Columns on a Composite Monitor	✓	✓	✓
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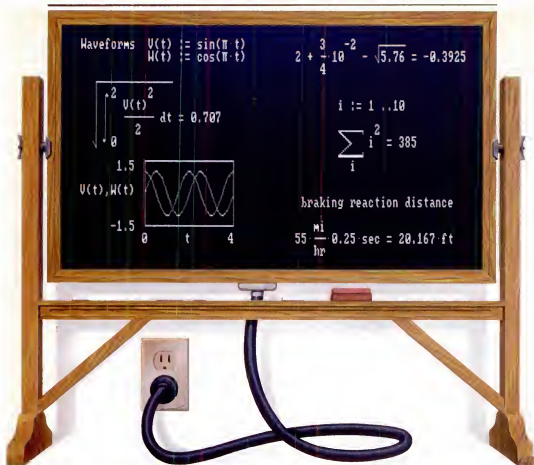
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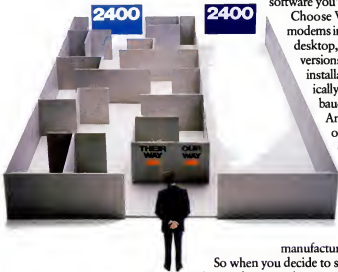
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# LETTERS TO PC MAGAZINE



## COMMENTS ON A\*STAR

There are several comments I would like to make regarding your review of A\*Star in "The Cheapest ATs Ever," *PC Magazine*, Volume 5 Number 18.

First, the A\*Star does not require re-setting to change speeds. The System Setup disk has a program to change speeds and can be used in batch files without resetting.

We agree that the A\*Star does need a hardware reset switch. As a result, we have installed one on the A\*Star II, our new multispeed machine.

Also, we were disappointed that you did not mention Wells American's 14 years' experience manufacturing microprocessor-based products. We have been manufacturing microcomputers longer than IBM!

Michael E. Hoyle  
Wells American  
West Columbia, South Carolina

While I must commend you on your excellent article "The Cheapest ATs Ever," I would like to point out an inaccuracy regarding the Wells American A\*Star.

In the article you referred to the Compaq 286, saying you could not get the same performance in a lower-priced machine. This is wrong. On every test I have made on my A\*Star Model 200, it has met or exceeded the performance of the Compaq. With a 20-megabyte Seagate ST-225, my average access time is 42.56 milliseconds, which is considerably faster than the Compaq's 56 milliseconds with 30 megabytes. Using Peter Norton's SysInfo utility, I get

a 7.7 return on the Compaq 286 and a 7.8 on my A\*Star.

Jeff Youell  
Sacramento, California

Author Jon Pepper replies:

*Our implication that the Compaq 286 will outperform the A\*Star product is correct. By virtually every measure on the PC Labs benchmark tests, the Compaq 286 was a better-performing machine than the 8-MHz A\*Star. You can certainly configure the A\*Star with a higher clock speed and higher performance drives, but these features add substantially to the purchase price. While the A\*Star is a good value, you tend to get what you pay for. If you want more performance from any machine, it will cost you.*

## THE WRONG PERCEPTION?

The article "Micro-to-Mainframe Connections: SNA Remote Emulation" (*PC Magazine*, Volume 5 Number 16) contains



a number of errors about our AST-SNA product that could adversely affect its perception in the market.

Although the article lists the applications program interface as optional, this feature is standard with the AST-SNA. Also, the maximum speed of our product is 9,600 bits per second not 4,800 bps as listed.

I'd also like to note that we have one product called the AST-SNA Cluster that supports multiple sessions with an RS-232 attachment, and we have another product called the AST-SNA Gateway that sup-

ports multiple sessions and works with local area networks. The article is not very clear about our Cluster product.

In addition, the article indicates that our product did not support programmed tabs. We did have a problem with this feature initially. However, when author Charles Teets called our technical support staff about this problem, we resolved it in one day.

David Tang  
AST Research Inc.  
Irvine, California

Charles Teets replies:

*I received all the above information from employees at AST Research and from the documentation accompanying the AST-SNA product. A product information employee at AST told me that the Application Program Interface was an optional, not standard, feature of the product, and the documentation clearly stated that the maximum modem speed was 4,800 bps. While PC Magazine gave AST's product extensive testing, we cannot question every statement in the user manual.*

## ANGERED PROGRAMMERS

I am one of the arrogant programmers Mr. Alsop chastises in his column "The Arrogant Programmer" (*PC Magazine*, Volume 5 Number 19). Had we all followed the fashion of the moment with respect to user interfaces, all word processors would work like WordStar. And wouldn't he just love that?

Tom Crispin  
Klamath Falls, Oregon

Stewart Alsop is a flaming cretin. His column "The Arrogant Programmer" displays his ignorance of the microcomputer software market, his lack of understanding

## ■ LETTERS



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of how new programs and products are developed for that market, and his own peculiar and offensive brand of arrogance.

Can a columnist in your magazine have so little exposure to the myriad new packages that appear for PCs that he has failed to notice the widespread adoption of Lotus-style menus and command structures? Are not *Windows*, *GEM*, *DESQview*, and so on converging toward a de facto standard user interface? Mr. Alsop complains about the three or four different interfaces he has had to learn. What is surprising is that there is any such standardization at all. That standardization is not by chance, and if programmers were arrogant, as Alsop asserts, the convergence wouldn't be happening. When a reasonably effective solution to a problem emerges, some programmers adopt it without hesitation.

Joel Schuman  
Woodstock, New York

The software-human interface problems addressed by Stephen Manes and Stewart Alsop are critical to rekindling growth ("The Famous Software School" and "The Arrogant Programmer," *PC Magazine*, Volume 5 Number 19). Their emotions about inconsistencies are well founded; as a user I share them.

William A. Ray, Jr.  
Portola Valley, California

### THIRD ANNUAL PRINTER SURVEY

Your excellent review of printers ("The Third Annual Survey: Printers," *PC Magazine*, Volume 5 Number 19) overlooked

one important component of printer performance: the impact pressure or ability to print legible carbon(less) copies. This aspect is particularly important to small businesses that use dot matrix printers to print multilayered self-mailer statements.

Alfred Feingold  
Coral Gables, Florida



interest. Your laboratory and technical writers have done us a great service by analyzing the various types of printers and giving us their personal recommendations.

In addition, the article was an eye-opener because until now the only laser machines I had seen were the Hewlett-Packard and another one called the Kyocera F-1010 Ultimate Laser. The 18 laser printers you tested were all a surprise to me.

Chris C. Petroff  
Alexandria, Virginia

Although I enjoyed your printer issue ("The Third Annual Survey: Printers"), the review on the IBM Proprinter XL had one somewhat significant error in that several times it mentioned that you lose con-

■ Had we all followed the fashion of the moment, all word processors would work like *WordStar*.

tinuous forms when utilizing the front sheet-feeder. In fact, the Proprinter XL allows you to back up the continuous forms. This feature is unique for a dot matrix printer, because it allows a "no loss" use of continuous forms.

Marty Steiner  
IBM Corp.  
Marietta, Georgia

Author Vincent Puglia replies:

*I still maintain you lose a few sheets of expensive customized forms when using the front sheet-feeder feature. Using a paper-advance knob to back up continuous forms, as suggested, is not only far from unique but just as apt to create a paper jam as it is to recover the advanced paper.*

In your article "The Third Annual Survey: Printers," not enough attention was given to one of the best features of the Fujitsu DX2200—the ability to feed cut sheets without removing continuous-form paper

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PC WORLD  
October 1986

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PC Week, August 27, 1985



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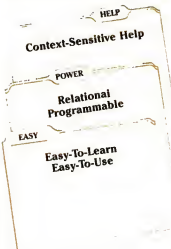
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## ■ LETTERS

from the tractor-feed mechanism. When you press the form-feed key while the printer is on-line, the printer backs out the continuous-form paper far enough to allow you to flip up the cut-sheet paper guide and insert cut sheets, envelopes, and so on. This is a superior solution to the way the IBM Proprinter does the same thing.

On the IBM Proprinter, there is a serious problem with paper thickness when you feed cut sheets and envelopes from the front. The paper gets jammed up against the middle of the printhead, and after a few moments of feeding envelopes this way, the middle pins on the printhead get chipped off. At that point, the IBM Proprinter prints only the tops and bottoms of characters.

Kathryn E. Prager  
Lexington, Massachusetts

Thank you so much for your superb issue on printers ("The Third Annual Survey: Printers"). I found your tests to be quite informative and interesting. I concur with your Editor's Choice, the Epson LQ-800.

You didn't say too much about the color-printing capability of the Epson LQ-2500. Does the LQ-2500 print near-

■ If the LQ-2500 can print color with NLQ, it will be fascinating to see how software publishers handle it.

ter-quality color characters and/or emulate the control codes of the old JX-80 color printer? If the LQ-2500 can print color with NLQ, it will be fascinating to see how the software publishers handle this printer.

Raymond Chuang  
Sacramento, California

Author Robin Raskin replies:

*Thanks for complementing our printer issue. It was no mean feat. The Epson LQ-2500 is very new and exciting. At this moment the printer is sitting on the desktops of many software publishers as they write*

*LQ-2500 drivers. The best advice I have for you is to call the software manufacturer of your choice and find out about its LQ-2500 intentions.*

*The LQ-2500 does print color NLQ characters; it does not, however, use the JX-80 color control codes. It is control-code compatible with the 24-pin Epson printers.*

## CORRECTIONS/AMPLIFICATIONS

Vault Corp., the maker of *FILELOK*, has changed its location since publication (*PC Lab Notes*, *PC Magazine*, Volume 5 Number 16). The new address is 2192 Anchor Court "C", Newbury Park, CA 91320.

Red River Technology, maker of the AT-las Board Kits ("Two Build-Your-Own Alternatives for AT Power," *PC Magazine*, Volume 5 Number 14), is still in business, under new management, at the same address.

The correct phone number for Channelmark Corp., maker of *Calendar Creator* (Reviews in Brief, page 62, *PC Magazine*, Volume 5 Number 16), is (800)851-2917 (outside California) and (800) 223-1479 (in California).

The correct phone number for QMS, maker of the QMS Kiss laser printer ("Laser Printers," *PC Magazine*, Volume 5 Number 19), is (205) 633-4300.

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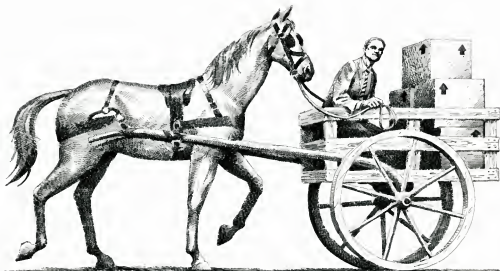
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## dbC Lattice Library Maintains dBASE Compatible Files With the Power and Speed of C

dbC™ links C to dBASE. It creates and maintains files and their indexes which exactly replicate dBASE file design. So dBASE can read and update them. And the reverse: dBC can use any files created by dBASE. Now C and dBASE can operate on the same data bases interchangeably. That opens up the widespread culture of dBASE installations to exploitation by C programmers. Tap that market, and the resident dBASE language, and gain the advantages of C with this single product. dBC's functions parallel all dBASE's file handling commands, many reprogrammed to give closer control. Each backed by demo source files on disk.

## WINDOWS for C/WINDOWS for DATA Microsoft Windows™ and TopView™ Compatible

Windows for C™ has a library of over 80 functions to add the pizzazz and practicality of window partitioning to your application. Unlimited windows, each defined in a C structure for easy reference throughout your program, can be made either to pop up or permanently overrule the screen. Routines will scroll and highlight lists with arrow keys, will read and scroll ASCII files vertically and horizontally in windows, and even write to memory-loaded files off the screen.

Logical treatment of video attributes permits unchanged programs to run on color or monochrome. Colors of windows are set individually.

All functions are in separate modules, only those used are loaded. Only buffers holding on screen or temporarily obscured windows occupy RAM, others released dynamically. Best overall timing and fastest display in Bit Hires 7:68. Tech Journal review of five windowing products.

Windows for Data comprises all of Windows for C but takes in data through the windows as well. At the high level a single function lets you specify prompt, string, field, length, data type, screen location, picture, target variable, then sets lesser functions scrolling to get and process a user's input. Three subroutines get system date and time, mess with strings, create your own macros for fields.

Field options can square empty, prevent entry, permit enter or overwrite, keep on or scroll or overflow linefeeds, and attachment of field-specific help messages.

## C-TREE B-Tree File Manager, Source Code, No Royalties!

C-Tree is a study code that has weathered many seasons of prolonged and widespread use. It comes in C source or you can compile it to a special case. No royalties provided you bend it into your binary application.

C-Tree's design splits sources to allow any number of users and data files open. It discards simultaneously even when updates are in progress. So multi-user configurations and adaptation to networks are possible. Record-locking routines are provided for

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and functions you want called to display messages or validate entries. And you decide which keys will clear a field, jump to the end or error, quit, etc. Options diverse enough that a set of 'fields' can be made to behave like a Lotus™ menu. Specify Compiler: Last PC Brand  
T5010 Windows for C \$195 \$149  
T0150 Windows for Data \$295 \$259

## MICROSOFT C 4.0 A Great C Battle Rages and You're Winning

As the dreadnaught pound each other with ever heavier ordnance, today's programmers reap the spoils of war. Bundling a source debugger and a 'make', and sporting a 'huge' memory model, permitting single data objects larger than 64K, the Microsoft C compiler has jumped a full version number to 4.0. But what's really impressive are the benchmarks reported in Dr. Dobbs' 8/80 encyclopedia survey of 17 C compilers. Microsoft's and IBM's C (increased from Microsoft's run away with the contest winning 11 of 22 benchmarks.

The 'codeview' debugger, free for a limited time, uses windows to show everything on one screen: source alongside disassembled object, variables, stack and registers. Drop down windows use a mouse if you like—deplete learning of commands. A source-level debugger that puts the rest

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to shame' (Dobbs). Microsoft C now has five memory models for code and data, plus non-library support for another thirteen, and boasts alternate math packages for speed versus accuracy. It also has over 8000/8000 traps. A big plus in multi-language settings: call from that C any routine written in later versions of Misch Pascal, FORTRAN, or Macro Assembler. Object code of full size may be incorporated directly into or commingled into libraries.

Both linker and library manager are part of the package as is the 'make', a UNIX™ name for a smart batch program which knows to expand maximum effort to rebuild any use of speed by compiling and assembling only elements affected by new or changed source files.

It is reportedly used by Lotus, Ashton-Tate and, fittingly, Microsoft itself to develop Windows. Dobbs calls it 'the best MS-DOS C development environment value today (but virtually any kind of system is reasonable — 386K suggested).

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## CURSES Unix Style Screen Management

Curses from Lattice™ manages the screen of the PC like UNIX. Curses library of 84 functions and macros parallels Unix's matching parameter lists. So Unix programs are at home on the PC and vice versa. Keeps any number of screens in memory, supports color, via function set to get characters, wrap lines, scroll, blank lines, highlight, etc. Like Unix, refreshes screen only on your command. Ask for: Last PC Brand  
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## PC ADVISOR



*Help in replacing a microprocessor, in emulating the Hewlett-Packard 41 calculator, in distributing inventory with an accounting program, and in selecting a good disk-optimizer.*

**REPLACING AN 8088 WITH A NEC V20**

I saw an ad claiming that the speed of a PC could be boosted 10 to 40 percent by the replacement of the 8088 chip with a V20 chip. It also said it's a simple chip-in/chip-out operation. How accurate a claim is this?

Jim Smith  
Oak Park, Illinois

The V-20 from NEC Corp. is so compatible with Intel Corp.'s PC-compatible microprocessors that Intel is suing NEC for patent infringement. The lawsuit is in the courts and could easily continue for years (Intel won the first round, but NEC is appealing). You'll probably increase raw computing speed by about only 10 percent overall; improvements of 25 percent are likely on pure number-crunching operations. Forty percent sounds way out of line.

A good source is Lohr Electronics (Dallas, Tex.; (214) 234-8032), which charges \$12.95. Owners of 8086-based machines should order the V30.

The only 8088-based PC we know of that is incompatible with the V20 is Texas Instruments' PC line.

Replacing the microprocessor is as simple as pulling out the old one (you can buy a \$2 chip puller, but strong fingernails will work as well) and carefully slipping the new chip into the slots. Just be very careful with your 8088: software that relies on sector timing (such as many games, CopyWrite, and Copy II PC) won't run on the faster V series. You may end up putting the 8088 back in some day.

**HP-41 SERIES EMULATION**

Is there any software that is similar to the Hewlett-Packard 41 calculator? As helpful as my PC is, I feel lost without it.

Gary Hatfield  
Address withheld

Amazingly, there is such an animal. ELI-41 from Eclipse Logic (Huntington Beach, Calif.; (213) 569-6020; \$78.95) emulates the HP-41 and improves on that wonder of the Reverse Polish Notation world. ELI-41 is memory resident, easily exchanges data with other programs, and supports an unlimited number of conversion tables and program files.

**ACCOUNTS UPDATING**

I am trying to put our hospital inventory on an IBM PC AT. I have tried two different programs but haven't found one that's able to receive inventory into central supply and then distribute it to different depart-

ments. Does any program do this?

Charles Tache  
Enid, Oklahoma

*It sounds as though the programs you are using do not have enough integration among their modules. NewViews (Q.W. Page Associates, Toronto, Canada; (416) 487-3424) should be up to the job.*

**OPTIMIZING A HARD DISK**

Is The Disk Optimizer a reliable product?

Steve Engrassia  
Wilmington, Delaware

*Our tests show it improves hard disk performance. For the uninitiated, it's a program that "repacks" the files on a hard disk—a process that's necessary because DOS lays data down in sectors of 512 bytes (some disks are formatted to different sector sizes) but usually does not put data in adjacent sectors. A typical large file is spread out over many tracks; The Disk Optimizer (SoftLogic Solutions, Manchester, N.H.; (800) 272-9900; \$49.95) puts all the sectors back in a tighter order, making data retrieval a lot faster.*

*One caveat: 1-2-3, Release 2.01, is not compatible with The Disk Optimizer because of a change Lotus made in its copy-protection scheme (none of the earlier 1-2-3 releases have the problem); SoftLogic promises to fix the problem shortly.*

■ Replacing the microprocessor is as simple as pulling out the old one and carefully slipping the new chip into the slots.

**ASK THE ADVISOR**

Send your questions to the PC Advisor, PC Magazine, One Park Avenue, New York, NY 10016.

# FORTRAN PROGRAMMERS

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# FIRST LOOKS

## Manuscript Whips Large Documents into Shape

### PC HANDS ON

BY BILL MACHRONE

*Manuscript*, the new word processor from Lotus Development Corp., will find a ready market with anyone who produces long documents subject to frequent revision. Specifically designed for engineers and scientists, it will be all the more attractive if you need to embed graphics in your documents.

It's difficult to convey the feel of a word processor in print, but if there's one word that describes *Manuscript*, it's struc-

ture. Everything about the product wants to help you control a document's creation, revision, its internal structure, formatting, and printing. The documentation is part of the overall structure. Bulking in at over 500 pages, it is nonetheless accessible and easy to use, with ample reference sections.

*Manuscript* defines text as unstructured or structured. The former is your usual word processing fare: letters, memos, and the like. The latter is where *Manuscript* really shines. It has a comprehensive outline that makes complex document prep-

aration a snap. It treats the document as a database made up of blocks of text rather than a continuous stream of characters.

You appreciate this feature when you have to reorganize a document by moving pieces around. The response is instantaneous, and you don't need to go through cumbersome paste buffers or clipboards. Documents collapse and expand in a keystroke, and sections automatically renumber themselves as you insert, delete, or change their order.

Structured mode also gives you the full power of block for-

mat. While you can specify the overall format of a document, you have full control over the type style, layout, and formatting of each block. You can also set up defaults so that your styles are consistent by section throughout the document.

*Manuscript* can print embedded charts and figures. It accepts .PIC-compatible files or even scanned images. But its graphics abilities may not be quite what you'd expect in this day of burgeoning interest in desktop publishing and WYSIWYG displays. You nev-

(continues on page 35)

## EGA Wonder: One-Card Solution for Graphics?

### PC HANDS ON

BY WINN L. ROSCH

Long ago, IBM Corp. drew a line, challenging you to cross it. The line is the cable that connects your display adapter to your monitor. If you cross it by mixing IBM's PC display standards, you're apt to end up with garbage on your screen—or a monitor that goes up in smoke.

The challenge is sorting through the five different standards used for PC displays—monochrome TTL, RGB color graphics (CGA), enhanced graphics (EGA), Hercules graphics, and composite video—and matching up your



ATI Technologies' combination of proprietary CMOS VLSI chips and the Chips and Technologies' EGA CHIPSet have made possible the first "any-display, any-graphics mode" video adapter for the PC. DIP switches (upper right) are accessible when the board is installed.

monitor, adapter, and software.

The EGA Wonder, manufactured by ATI Technologies, eliminates much of the confusion by allowing you to connect any display to your PC and use any standard video mode on it. You might call it an adaptive display adapter because it adapts the signals meant for one kind of monitor to those of an-

other—and enhanced on-screen quality along the way.

In many ways, it's a miracle worker. For instance, it will put EGA displays on standard CGA monitors with full EGA resolution—640 by 350 pixels in 16 colors. It will also display high-resolution monochrome-style text (8- by 14-character matrix) or Hercules high-resolution monochrome graphics on a

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# Managing Your Money: Still the Best Personal Financial Tool

## PC HANDS ON

BY LOREN AMSDEN

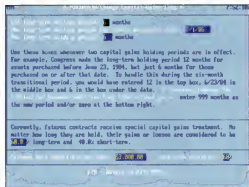
Andrew Tobias and the extremely competent programmers of Micro Education Corp. of America (MECA) have done it again: they have once more improved upon one of the most useful (and usable) tools ever designed to run on a personal computer.

For those of you who have never worked with *Andrew Tobias' Managing Your Money*, it should be noted that the program has always had three things going for it. First, for a price that can only be called a steal, Version 3.0 contains a collection of financial tools, including budget, checkbook, and portfolio managers; income tax and insurance estimators; and a

financial calculator that has powerful routines for retirement and college planning, investment analysis, mortgage ref-

inancing, and more.

Second, because the menu selections and on-screen instructions are written in plain



An integral element in *Managing Your Money's* structure is financial advice mixed in with calculations of your personal assets and liabilities.

## PC FACT FILE

### Andrew Tobias' *Managing Your Money*, Version 3.0

Micro Education Corp. of America  
285 Riverside Ave.  
Westport, CT 06880  
(203) 222-1000  
List Price: \$199.95. (Upgrade is free for subscribers to \$49.95 Plus plan.)

Requires: 192K RAM, DOS 2.0 or later.

In Short: A very well-designed, intelligent guide to personal financial management. Copy protected.

CIRCLE 408 ON READER SERVICE CARD

English, every one of these features can be used by anyone of average intelligence. (Tobias is the author of several best-selling books on savings and a regular contributor to *Playboy* magazine.)

## EGA Wonder

(continued from page 33)

CGA monitor or any other common PC display.

The conversion is carried out by a mixture of proprietary ATI Technologies CMOS VLSI components and the Chips and Technologies' EGA CHIPSet. A full 256K bytes of display memory is included as standard equipment to support advanced EGA features.

All the circuitry of the EGA Wonder—as well as connectors for a light-pen input and an output to an RF modulator—fits on a single 5-inch expansion card that uses the XT-style 8-bit data bus that will fit into a PC or XT chassis.

Using the EGA Wonder merely requires setting eight DIP switches to match the card to your monitor type and to indicate what type of display adapter you want the EGA Wonder to look like to your PC when it boots up. The switches are accessible through a hole in the retaining bracket of the card and can be adjusted without prying

the lid off your PC.

Once your system is running, you can change the display mode—from monochrome to EGA graphics to a special 132-column font—with a program ATI Technologies supplies with the board. The EGA Wonder is smart enough to adjust itself when other software changes the display mode, for instance, when a Hercules driver switches into graphics mode, without running any other utilities.

It also optimizes images to best fit the capabilities of different monitors. For instance, standard CGA graphics are double-scanned on EGA monitors.

The EGA Wonder works and does its job well. However, it cannot overcome the limitations inherent in monitors that are built to match the older display standards. In particular, when it puts the 350 lines of an EGA image on a CGA display (which can nominally handle only 200 lines), the EGA Wonder resorts to interlacing. (An interlaced screen is scanned twice in succession with the second set of lines interwoven in between the

first set. The double-scan doubles screen addressability.)

The result of the EGA Wonder's interlacing of a CGA display is a nervous-looking, eye-straining flicker. ATI Technologies downplays the problem by saying that it's only bad on long white lines. I found the shimmering image bothersome on text.

EGA-on-CGA-monitor images also suffer from a distorted aspect ratio: characters and graphics look squashed, squeezed down by about 12.5 percent. The problem is that 50 lines on the screen are left blank because an EGA image has 350 lines and the interlaced monitor screen has 400.

Furthermore, the EGA Wonder may not be compatible with all so-called compatible computers. It would not work in an Epson Equiva I no matter how I set the various DIP switches.

Because of its exotic nature, the EGA Wonder is a product you will want to try in your particular model of computer with your particular model monitor before you buy it.

## PC FACT FILE

### ATI Technologies Inc.

450 Esnn Park Dr.  
Markham, Ontario,  
Canada L3R 1H5  
(416) 477-8804

List Price: \$399

Requires: Composite, TTL monochrome, or CGA- or EGA-compatible monitor.

In Short: A universal video adapter that allows you to use any monitor with any video standard and display mode. The adapter works well within the limitations of the hardware it connects to.

CIRCLE 409 ON READER SERVICE CARD

That said, the EGA Wonder may be all the display adapter you need—at least until some devious marketing magnate at IBM unleashes yet another display standard. The EGA Wonder is priced competitively with ordinary EGA adapters and adds much more versatility. ☐

Third, rather than print a large manual with lots of charts and pictures, Tobias opted to place the manual in the program as a comprehensive set of context-sensitive "help" screens. Contrary to standard help screens that deal with software mechanics, these screens are really a primer on personal money management, written in language that we who did not go to business school can understand.

The great addition to Version 3.0 is a set of tax tables reflecting the impact of the Tax Reform Act of 1986. The program lets you modify tax tables manually, but included in MECA's \$49.95-per-year Plus customer service plan is at least one update to the program incorporating any changes to the tax laws. This year, that means tax tables for 1986, 1987, and 1988, based on the best information available when the program "went to press." Also included in the Plus plan is a quarterly newsletter from Andrew Tobias that helps keep you up to date on tax and other legal issues and offers new ways to use the software. The program's notepad is now accessible from every module.

Probably the only fault we can find with *Managing Your Money* is its copy-protection scheme. Occasionally on boot up, the program will ask to read the original disk, checking to find a copy-protection code. If you can't find your key disk, the program will lock you out until you come up with it.

Don't pass up *Managing Your Money* just because it is essentially personal software. The program comes with a number of very useful tools not related to financial advice. There's a simple, flat-file data manager (for client names and addresses, for example), a utility that prints some very nice reports (which can be edited with a word processor), graphing for basic bar and pie charts, and a continuous-form check printer (the equal of the best of them).

When *Managing Your Money* was first introduced in 1984, it was the best money management software available for a wide range of people. In 1986, that still holds.

## Manuscript

(continued from page 23)

er see the graphics on-screen while you are editing; you merely indicate where they are to go with a backslash command.

*Manuscript* does not have a WYSIWYG mode during editing. Instead, it depends on a powerful preview mode (actually printing to the screen), complete with a magnifier to inspect each image, down to the pixel, before printing. The designers decided on this course of action because of the enormously long documents that *Manuscript* is designed to handle: up to 700 pages. At that length, the amount of time it takes to build bit-mapped displays on a graphics screen could put a serious crimp in one's editing.

It generates tables of contents, tables of figures, indexes, and cross-references, in addition to the usual notes and footnotes. The method for indicating text to be indexed or referenced is the easiest I have ever used.

No scientific word processor would be complete without equation editing, and *Manuscript* has it. This is one place where a full graphics mode would really help. Heavy users of equations will find themselves going in and out of review mode as often as they create and revise formulas. The editor itself uses English phrases to describe the elements of the equation. It isn't bad, but after you've used MathSoft's

*MathCAD* it's tedious by comparison.

One thing you can do in the editor is "compose" special symbols. Many common symbols that are not on the PC keyboard are predefined. Pressing Alt-F1 (the compose key), then hitting "a" and the apostrophe gets you an accented "a." Similarly, a hyphen and a colon get you a division sign. Convenient and easy to remember.

The table editor is an absolute gem since it not only imports tables from Lotus worksheets but allows you to manipulate them easily. You can draw lines and boxes, create new rows and columns, and modify headings and legends, all easily and intuitively.

One of *Manuscript*'s most heads-up features is its batch mode. There are conventions for passing any necessary set of keystrokes through to the program's modules, so it can tackle the big jobs in your absence. Thus you can stoke your laser printer's belly with paper, queue up *Manuscript*, and come back to a finished document. You can have different batch files for different occasions, such as only needing to print a portion of the document or a draft instead of a quality copy.

Some preparers of large, complex documents will be disappointed to learn that *Manuscript* doesn't do multicolumn printing. It does, however, do side-by-side text and graphics.

You control *Manuscript* from a 1-2-3-like command

## PC FACT FILE

### Manuscript

Lotus Development Corp.  
55 Cambridge Pkwy.  
Cambridge, MA 02142  
(617) 577-8500

List Price: \$495

Requires: 512K RAM, hard disk, DOS 2.0 or later.

In Short: Powerful word processor meant for technical documents. Not copy protected.

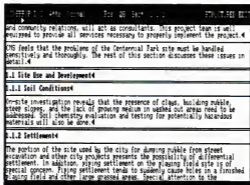
CIRCLE 444 ON READER SERVICE CARD

line, complete with moving-bar menu, or by "accelerator" keys that put a subset of the functions on Ctrl-key combinations. The bad news is that some very useful functions are down a level or two in the hierarchical menu system. The good news is that an important subset of the useful stuff is on the accelerator keys.

Another piece of very good news is the help system. 1-2-3 elevated everyone's opinion of what a help system should do, and *Manuscript* has nothing to be ashamed of. After a brief demo, I ran *Manuscript* from nothing more than a sense of the way Lotus programs are supposed to work and the help screens. The biggest adjustment for 1-2-3 users will be reaching for the F10 key instead of the Slash key.

All in all, I've seen few programs with more functionality or fitness for purpose than *Manuscript*. Before it emerged, there were rampant rumors that it would spread like wildfire from the engineering and scientific market and stand the word processing market on its collective ear. Well, some clowns will use it as a memo writer, but that's not what it's for. *Manuscript* wants your PC's full attention: megabytes of fast disk, a graphics screen, preferably an AT, and all your memory. There isn't even enough room to cram a self-respecting RAM-resident program in with it.

But that's okay. If you create big, technical documents and do it often, you're going to love *Manuscript*.



Lines separate structured blocks of text in a Manuscript display. The screen can be compressed to show only outline, partial text, or full text.

# CCI ST/386 Brings Mail-Order Prices to 32-Bit Computing

## PC HANDS ON

BY JOE DESPOSITO

If you wondered whether the price of 80386-based PCs would plunge once a few of them reached market, here's your answer: The CCI ST/386 from Computer Classifieds has a base price of \$3,195. And the company's ST/386, Model 40, which is comparable to Compaq's \$6,499 Deskpro 386, is priced at \$4,220.

The 80386 is on a board that plugs into a 32-bit expansion slot; there are also three stan-

dard 16-bit and three standard 8-bit expansion slots. One slot is reserved for a 32-bit dynamic RAM board. This board now holds 768K bytes, but CCI plans to sell 4- and 16-megabyte RAM boards.

The ST/386 uses portions of the Chips and Technologies' 80286 CHIPSet. CCI augments this set with its own custom logic chips so that the ST/386 performs 32-bit, as well as 8- and 16-bit, data transfers, allowing the 80386 to operate at full speed. Originally designed for 12-MHz operation, the ST/386 has been tweaked to run about

20 percent faster.

The CCI ST/386 offers a great deal of performance for the price. The fact that the 80386 resides on a daughter-board and that RAM is in a proprietary slot appears not to affect either software or hardware compatibility with current products. However, you are locked into purchasing your RAM upgrades from CCI.

Since there is no 386 standard to adhere to, any 80386 purchase represents a risk, but if you don't mind taking chances, the CCI ST/386 is an attractive system.



## FACT FILE

### CCI ST/386

Computer Classifieds Inc.

17830 State Rd. 9

Miami, FL 33162

(305) 651-5853

**List Price:** Base unit, including 640K of 32-bit dynamic RAM, 1.2-Mbyte disk drive, enhanced AT-style keyboard, and serial/parallel card, \$3,195; Model 40, with 40-Mbyte hard disk drive, \$4,220; Model 72, with 72-Mbyte hard drive, \$5,120.

**In Short:** An 80386-based PC whose system board has 32-bit slots for a microprocessor board and a memory board.

CIRCLE 441 ON READER SERVICE CARD

# A\*Star II: 12-MHz Speed for \$2,690

## PC HANDS ON

BY JOE DESPOSITO

A new computer from Wells American is poised to give PC's Limited a run for the low-cost, high-performance PC money. The A\*Star II runs its 80286 processor at 12 MHz, and at \$2,690 it costs \$5 less than the PC's Limited 12-MHz machine.

Actually, the PC is sold for

\$2,295, and a \$395 optional kit (including logic chips and a 12-MHz 80286 processor) allows you to run it at 12 MHz. A software utility lets you choose from among five other speeds: 10 MHz, 8 MHz (zero or one wait state), and 6 MHz (zero or one wait state).

### Zigzag In-Line Package

The system board is designed and built by Wells American. On the board are 120-nanosec-

ond dynamic RAM chips housed in ZIPs (Zigzag in-line package). With this design, 1,024K RAM takes up an area on the board of just 1½ by 3 inches. The A\*Star II uses a proprietary BIOS.

Overall, the system receives good marks for engineering and performance. And at a price tag of \$2,690 for a complete system, it is a tempting choice over more-expensive, software-starved 80386 models.



## FACT FILE

### A\*Star II

Wells American

3243 Sunset Blvd.

West Columbia, SC 29169

(803) 796-7800

**List Price:** Model 300, including 1,024K RAM, \$2,295.

**In Short:** A low-cost PC that can operate at 12 MHz.

CIRCLE 442 ON READER SERVICE CARD



## Benchmark Tests: CCI ST/386 and A\*Star II vs. Compaq Deskpro 386

As expected, the CCI ST/386 (running at 14.2 MHz) is faster than the 12-MHz A\*Star II, but slower than the 16-MHz Compaq Deskpro 386 in the processor tests. Because it's larger, it's to be expected that the 70-megabyte Toshiba hard disk in the CCI ST/386 has the fastest access time.

Product	NOP	8086 Instruction Mix	DOS Disk Access (milliseconds)
A*Star II	2.8	5.90	28.80
CCI ST/386	2.4	5.00	24.30
Compaq Deskpro 386	2.1	4.30	26.80

The **NOP** benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in microprocessors and the effect of memory caching. This test executes almost nothing but NOP ("No Operation") machine code instruction in a big 108K loop.

### Performance Times

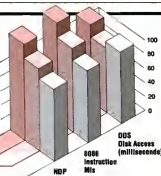
(Times given in seconds)

Product	8086 Instruction Mix	DOS Disk Access (milliseconds)
A*Star II	5.90	28.80
CCI ST/386	5.00	24.30
Compaq Deskpro 386	4.30	26.80

The **8086 Instruction Mix** benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 8086 instruction code. These instructions are a subset of the total processor instruction set.

### Relative Times

(Ratio: Compaq Deskpro 386 = 100)



The **DOS Disk Access** benchmark test measures the time it takes to do a random sector read using DOS. DOS buffers are set at 3 and the interleaved factor is left at the disk drive's default setting. This test adds DOS's overhead to the BIOS and hardware times. The test program performs the sector read 1,000 times within the DOS disk partition. The average result is shown in milliseconds.

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Allows uncollected credit memos.

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Allows return credit memos.  
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PC-DOS-IBM MS-DOS-Microsoft  
CP/M Digital Research

# PC-Sprint: \$100 PC and XT Racing Kit

## PC HANDS ON

BY MITT JONES

The Loch Ness Monster could hardly be more elusive than a no-hassle, low-cost speed-up board for PCs and XTs.

But don't add a game port to your old PC and move it to the playroom yet: PC-Sprint from Exec-PC may be the speed demon you've been looking for.

For less than \$100, you get a processor rated at 8 MHz to replace your 8088 and a no-slot accelerator board that won't hog an expansion slot or crash your system—once you've found your system's top speed.

You can expect significant

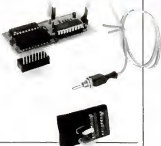
improvement with PC-Sprint. Many PCs and XTs will run at a snappy 7.38 MHz with PC-Sprint, and those that won't should run at 6.67 MHz.

An external switch lets you toggle between high and normal speed on the fly.

PC-Sprint plugs into your system's 8284 clock chip socket. You remove your 8284 chip, plug that chip into a socket on the PC-Sprint board, and then plug the board into the vacated 8284 socket.

Exec-PC supplies three crystals with PC-Sprint. The fastest crystal, running your PC at 7.38 MHz, may not run if there are low-speed memory chips in your system. If that is the case,

The PC-Sprint board with one of its three crystals installed. The pins, protruding from the bottom plug into the PC's 8284A socket. At bottom right are two additional crystals and one short socket extension. The optional NEC V20 processor is at left.



you replace the fastest crystal with the intermediate-speed crystal. Installation should take about 30 minutes.

I encountered some problems when I ran PC-Sprint at its highest speed. The first XT I upgraded had trouble booting and refused to load the software packages I tried. After I installed the slower crystal the machine booted and ran well.

The next XT I tried booted at the fastest speed but gave an error message after the memory check. Once it booted, however, the machine ran flawlessly at 7.38 MHz. The slower crystal solved the boot error message.

PC-Sprint stands out among no-slot accelerator boards because of its price and a utility that allows high-speed disk formatting. Most accelerator boards require that you switch to low speed before formatting.

But don't rush your order in.

Since PC-Sprint must plug into an 8284 socket, be sure your PC's clock chip is socketed. If it's soldered on your board, installing PC-Sprint can be more trouble than it's worth.

## How PC-Sprint Works

The crystal in your PC sets the rate of the signal the 8284A clock chip generates. That signal sets the pace at which your system operates.

A faster crystal will speed your processor, but other components of your PC won't function properly.

PC-Sprint takes advantage of a little-used 8284A feature to solve the conflict: the chip can transmit either its own signal or an externally generated signal.

PC-Sprint uses the PC's original crystal and 8284 chip but PC-Sprint also adds its own 8284 and a faster crystal. A complex interconnection scheme—which involves routing the signal each 8284 generates to the external signal input of the other clock chip—allows PC-Sprint to change processor rate on the fly without altering the signal that is fed to other components.

—MITT JONES

## PC FACT FILE

PC-Sprint  
Exec-PC Inc.  
P.O. Box 11268  
Shorewood, WI 53211  
(414) 242-2173  
List Price: \$89.95, NEC V20 or Intel 8088-2 processor, \$10 if ordered with PC-Sprint.  
In Short: A simple, no-slot accelerator board that boosts PC and XT performance.

CIRCLE 443 ON READER SERVICE CARD



## Benchmark Tests: IBM PC-XT with PC-Sprint vs. Unimproved IBM PC-XT

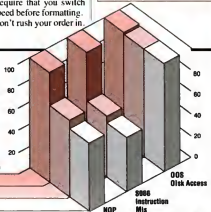
PC-Sprint's accelerated clock speed is reflected in the NOP test by a proportional improvement. In the Instruction Mix, the effect of the NEC V20 processor kicks in. Disk Access times were not significantly affected by the clock speed changes.

Product	NOP	8088 Instruction Mix	DOS Disk Access (milliseconds)
IBM PC-XT	10.11	32.02	114.62
XT with PC-Sprint (at 6.67 MHz)	7.08	17.69	112.57
XT with PC-Sprint (at 7.38 MHz)	6.32	15.76	112.58

The **NOP** benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in microprocessors and the effect of memory caching. This test executes almost nothing but NOP ("No Operation") machine code instruction in a big 128K loop.

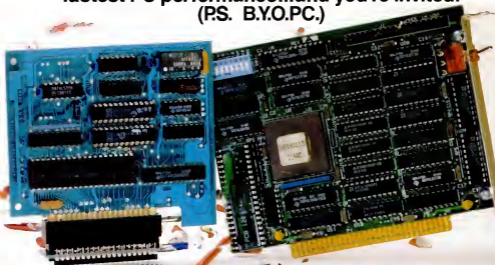
The **8088 Instruction Mix** benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 8088 instruction code. These instructions are a subset of the total processor instruction set.

The **DOS Disk Access** benchmark test measures the time it takes to do a random sector read using DOS. DOS buffers are set at 3 and the interleave factor is left at the disk drive's default setting. This test adds DOS's overhead to the BIOS and hardware times. The test program performs the sector read 1,000 times within the DOS disk partition. The average result is shown in milliseconds.



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- socket for 80287 math co-processor!

suggested retail price **\$599**

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# Finally, a language worth

For years BASIC has been everyone's first language. And for almost as long, they've been tempted by other languages. Lured by promises of more speed, more power.

We have a solution. A new language that's a substantial improvement over BASIC. Faster. More structured. Finally, a compelling reason to leave BASIC.

Introducing Microsoft's QuickBASIC Compiler, Version 2.0.

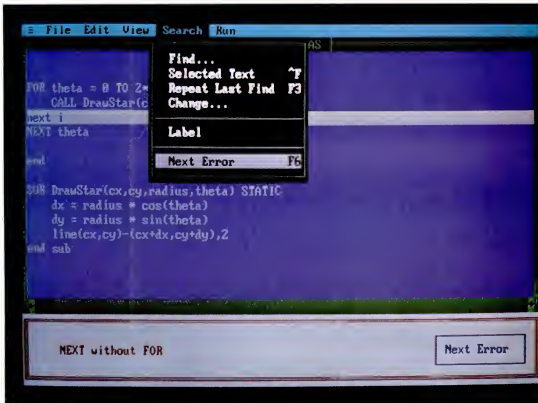
At last, you can have the latest programming techniques, combined with the solid foundation of BASIC. Our new compiler is as compatible with BASIC as you can get. At the same time it offers the extra speed and power you've been looking for.

## Run faster with compiled code.

If there's one thing you've asked for, it's speed. And Microsoft® QuickBASIC simply blazes. Old BASIC programs will run up to ten times quicker once they've been compiled. Sometimes even faster.

## Everything you need. Built-in.

Making programs run faster is only part of the story, though. The new Microsoft QuickBASIC Compiler includes a full-screen editor, built-in. So now you can make the jump from writing to RUNNING in no time flat. Edit your program, compile it, and run it. Faster than any other BASIC compiler around. All without leaving our on-line help and prompts.



# leaving BASIC for.

On the rare chance your program doesn't run 100% the first time out, we've got another surprise for you. The Microsoft QuickBASIC debugger. Our full-screen tracing lets you debug your programs while watching the source code execute. A line at a time, or with breakpoints. As easy as can be.

Our compiler is also smart enough to save you time. First, by finding any errors in one pass. Second, by putting your editor's cursor on the problem. Automatically. So you don't have to get lost in a maze of error codes and line-numbers.

## The BASIC virtues. And more.

Speaking of line numbers, let's not. Because line numbers are strictly optional. And Microsoft QuickBASIC lets you use alphanumeric labels as well. Now you can GOTO *ErrorCheck* instead of line number 6815.

Or you could stop using GOTOs altogether. There are a variety of options that could make the GOTO an endangered species. Features like multi-line IF-THEN blocks. And named sub-programs. Now your BASIC programs can be as structured and organized as you want.

We've only just begun to talk about the virtues of Microsoft QuickBASIC. There are dozens of enhancements to your favorite language. Things like larger arrays. Local and global variables. Reusable modules that let you create libraries of your most often-used routines. All explained in a revised manual that includes a complete language reference.

## Making your quick escape.

If all these features follow your BASIC instincts, then zip on down to your nearest Microsoft dealer. That's where you'll discover the best surprise of all. The price. Only \$99 for the best reason to leave BASIC.

For the name of your nearest Microsoft dealer, call (800) 426-9400. In Washington State and Alaska, (206) 882-8088. In Canada, call (416) 673-7638.



### Microsoft QuickBASIC Compiler Version 2.0 for IBM PC and Compatible Computers.

#### BASICA Compatibility

- Sound statements including SOUND and PLAY.
- Graphics statements including WINDOW, VIEW, DRAW, GET, PUT, LINE, CIRCLE, LOCATE and SCREEN.
- Support of EGA extended graphics modes. NEW!
- BASICA structures are supported including WHILE/WEND, IF/THEN/ELSE, FOR/NEXT, GOSUB/RETURN, and event handling.

Results of Sieve Benchmark	BASICA 3.1	Microsoft QuickBASIC 2.0
Seconds per iteration	78	0.52

#### Complete Programming Environment

- Built-in Editor that places the cursor on found errors automatically. NEW!
- Compile entirely in memory at speeds up to 6000 lines per minute. NEW!
- Link routines once when starting a programming session and no need to link again when changing programs. NEW!
- Built-in debugger with single-step, animate, and trace modes. NEW!

#### Create stand-alone programs.

#### Alphanumeric Labels

- Can be used to make your programs more readable. Line numbers are not required but are supported for BASICA compatibility.

#### Structured Programming Support

- Block IF/THEN/ELSE/END IF eliminates the need for GOTO statements. NEW!
- Subprograms can be called by name and passed parameters. Both local and global variables are supported.

#### Modular Programming Support

- Separate compilation allows you to create compiled BASIC libraries to use and re-use your programs.
- A library of routines to access DOS and BIOS interrupts is supplied. NEW!

#### Large Program Support

- Code can use up to available memory.
- Numeric arrays, each up to 64K bytes, can use up to available memory. NEW!



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The High Performance Software™

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# The industry's toughest critics confirm what over 20,000 users already know.

Over 20,000 PC users have increased their productivity with PC Technologies' 286 Express accelerator card. They are getting up to 600% more processing power from their PC/XT or compatible. Read the critics. Then call PCT to set up a **risk-free evaluation** or for the dealer nearest you.

**"Thanks to brilliant design (and, particularly, good use of cache memory) the 286 Express Card delivers at least threefold speed increases."**

Jim Seymour, *PC Magazine*

**"Probably the most useful speed-up-board we've seen to date."**  
 Garry Ray, *PC Week*



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 MERIT AWARD WINNER**  
 Fortune Magazine's  
 AFIPS 1986 Hardware  
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**"Easy to install and invisible to users, the 286 Express Card is an excellent value... I found nothing to criticize."**

Dr. Michael Ecker, *Government Computer News*

**"The IBM PC with the 286 Express Card consistently outperforms a comparably equipped IBM PC/AT. The speed increases over the basic IBM PC were dramatic..."**  
 Jerry Schneider, *Capital PC Monitor*

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**CIRCLE 196 ON READER SERVICE CARD**

# ImageMaker Reinvents the Film Recorder for PC Text Slides

## PC HANDS ON

BY WINN L. ROSCH

Lock your mind into a preconceived notion—that PC film recorders must be based on cathode ray tubes—and you may miss some of the world's great



Use of character-based film wheels gives ImageMaker slides a resolution equivalent to 8,000 lines across.

pleasures. Take a look at the 35mm slides made by Presentation Technologies' ImageMaker system, and you'll wonder why you put up with CRTs.

According to Presentation Technologies, the CRT is the biggest limitation on film recorders that make slides from PC graphics, and so the company eliminated it. Instead of operating as a video system, the ImageMaker works like a daisy wheel printer, exposing film to a beam of light that has passed through a cutout character on a rotating wheel.

A complex but precise mechanism focuses and exposes text characters from the font cartridge onto the film, one by one. Although the ImageMaker cannot produce different sizes of type by enlarging or reducing the fonts in a cartridge, several sizes and/or styles are available in each cartridge.

The ImageMaker handles some simple charts and graphs by using a drawing stylus—essentially a dot on a font cartridge.

Amazingly compact, the ImageMaker is about half the size of a laser printer. It has virtually no user controls (those chores are left to software) and few indicators. Even its standard equipment 35mm camera back tucks neatly away behind a swinging plastic door.

The ImageMaker connects to a PC using a serial port. Presentation Technologies offers its own presentation graphics program called *ImageMate*, which controls the ImageMaker and generates both text slides and simple charts. Other software compatible with the ImageMaker includes *PC-Slide*, *Harvard Presentation Graphics*, and *SlideWrite Plus*.

Overall, the ImageMaker's slides are impressive—text resolution is the equivalent of 8,000 lines across the film—but the system forces trade-offs. The color selection is modest (16 foreground and 6 background colors), and the machine is at its best only for text slides.

According to Presentation Technologies, nearly 90 percent



About half the size of a laser printer, ImageMaker's 35mm camera is tucked behind a swinging door.

## PC FACT FILE

### ImageMaker

Presentation Technologies  
743 N. Pastoria Ave.  
Sunnyvale, CA 94086  
(408) 749-1959

List Price: \$4,995; *ImageMate* software, \$295; font cartridges, \$395.

Requires: Serial port.

**In Short:** A novel film recorder that does away with the CRT by using a daisy wheel-like font cartridge to make high-resolution text slides and some chart styles on 35mm film.

CIRCLE 426 ON READER SERVICE CARD

of all business graphics are text slides. If your needs match that majority, the ImageMaker may be a compelling choice.

# Iprint Adds Graphics Tricks To Laser Printers' Repertoire

## PC HANDS ON

BY GLENN HART

Laser printers are wonderfully speedy, quiet, and flexible, but it's not always easy to make them perform the tricks that they're capable of. Fortunately, powerful software utilities like Indigo Software's *Iprint* are ready to the rescue.

*Iprint* helps you take advantage of the graphics features of many leading laser printers, including machines from Hewlett-Packard, AST, Quadram, Canon, and others. *Iprint* uses the extra hardware features on

more-advanced laser printers, but it also runs smoothly with even the simpler models. The latest version of *Iprint* now makes good use of EGA and Hercules video adapters.

*Iprint* works best with a mouse, but you can move the cursor and simulate the mouse buttons with keystrokes.

*Iprint* lets you draw simple graphics primitives like lines, circles, boxes, and rounded boxes. You can also adjust the line type and width, but unfortunately these changes aren't reflected on the screen. You can type text directly into the pro-

gram or import ASCII text files prepared with any editor.

*Iprint* really isn't a full-fledged desktop publisher, but you can certainly do some of the things such programs offer. You have full control over fonts, including resident, cartridge, and downloadable fonts.

*Iprint* can import charts produced with *I-2-3* or *Symphony*, and you can position and scale them as you wish. You can also create logos and other graphics with *PC Paintbrush*, *PC Paint*, or *Microsoft Windows Paint* and convert them to *Iprint* format.

*Iprint*'s variable line type and widths, shaded areas in var-

## PC FACT FILE

### Iprint, Version 3.0

Indigo Software Ltd.  
1568 Carling Ave.  
Ottawa, Ontario  
Canada K1Z 7M5  
(613) 728-0016

List Price: \$349

Requires: 384K RAM, DOS 2.1 or later.

**In Short:** Enhances laser printer graphics. Not copy protected.

CIRCLE 426 ON READER SERVICE CARD

ious densities, and other graphics and text capabilities make it easy to design and print attractive business forms.

*Iprint* is both easy to use and powerful. If you own a laser printer, *Iprint* can add appreciably to your software arsenal.

# ■ NEW ON THE MARKET ■ JONATHAN K. MATZKIN

## **Two-Piece Surge Suppressor Saves Desk Space, Includes Clock**

Kensington Microwave's Master Piece Remote is a surge suppressor and power director that may fit into overly crowded desktops and workstations where conventional units won't. The \$199.95 device, which also offers EMI/RFI noise filtering, static protection, modem surge suppression, and a built-in digital clock, consists

of two compact parts.

A five-outlet power strip contains the power and modem surge-suppression hardware and sits out of the way on the floor. A small remote control unit houses the switches and a digital clock and sits conveniently on the desktop.

**List Price:** Master Piece Remote, \$199.95. Kensington Microwave Ltd., 251 Park Ave. South, New York, NY 10010; (800) 535-4242.

CIRCLE 436 ON READER SERVICE CARD



Master Piece Remote is a deluxe surge suppressor and power director. The \$199.95 two-piece unit has a novel, space-saving design.

## **PEP Software Package Transfers Data from Any Computer to a PC**

Intelpo has introduced PEP, which costs \$59.95 and moves data from any computer capable of RS-232 communications to an IBM PC or compatible. PEP, which is short for printer-emulation package, is designed to make the PC appear to be a printer, so that any application that is running on any other computer can "print" its data to the PC via an RS-232 cable.

PEP can simultaneously receive data, modify it for MS-DOS compatibility, store it to disk, display it on a monitor, and print it on a printer. PEP stores separate data transmissions as separate files on-disk. The program interprets a 5-second pause between transmissions as an end-of-transmission indicator, so a sequence of distinct data files can be transmitted to a PC and saved as distinct files.

Suggested applications include making the transition from 8-bit environments to MS-DOS and moving data from hostile operating systems to the PC.

Intelpo says PEP will work with any RS-232 capable computer, from a hand-held portable to a large mainframe.

**List Price:** PEP, \$59.95.

**Requires:** 192K RAM, one disk drive, RS-232 cable, RS-232-compatible second computer, DOS 2.0 or later. Copy protected. Intelpo, 13 Saratoga Dr., Kirkland, Quebec, Canada H9H 3J9; (514) 694-6862.

CIRCLE 437 ON READER SERVICE CARD

## **HOT PROSPECT**

## **Lotus and MCI Team Up to Offer E-Mail Binary File Transfers**

Lotus Development Corp. and MCI Communications Corp.'s \$100 Lotus Express provides two features that MCI Mail has so far lived without: a menu-driven interface and the ability to transmit binary files like spreadsheets or databases, in immediately usable form, without reformatting.

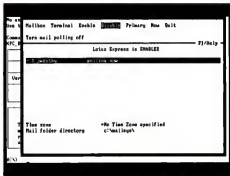
The program runs concurrently with other applications. Lotus Express largely automates the electronic-mail service by logging on at user-specified intervals and retrieving incoming mail. An audio tone signals that mail has been received.

MCI messages can be composed and edited off-

line using Lotus Express's full-screen editor, which features word wrap, cut and paste, and search. The \$100 cost includes a 1-year MCI Mail account.

**List Price:** Lotus Express, including MCI Mail subscription, \$100; additional charge per outgoing message, based on length and type of service. **Requires:** 256K RAM (640K RAM for use in conjunction with other applications), Hayes-compatible modem, two disk drives. Hard disk recommended. Not copy protected. Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; (617) 577-8500.

CIRCLE 431 ON READER SERVICE CARD



Lotus Express is a menu-driven interface for MCI Mail. The \$100 software easily transmits binary files, with no reformatting required.

## **Memory-Resident Utility Compresses Files On-Disk**

Memory-resident software from SunDog Software Corp. compresses files to make the most of available disk space. SunDog claims that Squish, which costs \$79, can dramatically increase the amount of information stored on any disk.

Databases can often be squeezed into 10 to 25 percent of the space required in their uncompressed state, SunDog says. Word processing documents can be compressed into less than half of their normally required space, and spreadsheets and other binary files can be compressed by 20 to 40 percent, according to the company.

Instead of using 1 byte for each character of a file, Squish assigns short codes to characters that appear often in a file. Longer codes are used for less frequently appearing characters. Long strings of characters are represented by a shorthand notation.

Squish occupies 40K bytes of RAM and reexecutes files in memory rather than on-disk. Consequently, the space saved on-disk can be freely used by other files, and no advance

planning is required before using compressed files.

SunDog says that all programs that use standard DOS functions for reading and writing can use squished files, and *Squish* is compatible with other memory-resident programs such as *SideKick*.

**List Price:** *Squish*, \$79. **Requires:** 256K RAM, DOS 2.0 or later. Not copy protected. SunDog Software Corp., 264 Court St., Brooklyn, NY 11231; (718) 855-9141.

CIRCLE 438 ON READER SERVICE CARD

## CompareRite Makes Draft Comparisons, Highlights Changes

Many professionals work with successive drafts of long, complex documents. Changes from one draft to the next can be critically important but are often a major headache to spot and keep track of. *CompareRite*, from *JuriSoft*, compares two drafts and highlights changes.

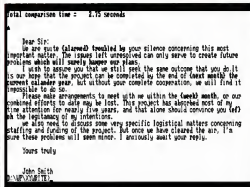
The program reads documents directly from a word processor and places its comparison draft in the same format. So an editor can produce a revised draft without marking it up, and *CompareRite* will generate a document that reflects the

changes between the editor's copy and the original document.

Users can specify the appearance of added and deleted text. Deleted text can be marked with a number, with the actual deletions appearing as an end note; or deletions can be underlined while insertions are boldfaced, among other possibilities.

**List Price:** *CompareRite*, \$99.95. **Requires:** 256K RAM. Copy protection removed upon user registration. *JuriSoft* Inc., 336 Harvard St., Cambridge, MA 02139; (617) 864-6151.

CIRCLE 439 ON READER SERVICE CARD



*CompareRite*, from *JuriSoft*, marks revisions in successive drafts of a document. The user can specify how the \$99.95 program marks specific changes.

## Two Laptops: One Costs Under \$1,000, The Other Has 20-Megabyte Disk Option

*Datavue* Corp. aims one laptop at price-conscious buyers and another at power users.

The 9-pound *Spark*, at \$995, may attract users who have waited for laptop prices to drop. It comes with a 3½-inch 720K-byte floppy disk drive; 384K RAM; a twisted-crystal, bire-

*The Snap 1+1*, at \$2,095, is *Datavue* Corp.'s entry in the high-end laptop market.

fringent screen; and serial, parallel, RGB, and composite ports. *Datavue* says the computer will operate continuously for up to 8 hours on its rechargeable battery.

The *Spark* is based on an 80C88 processor, running at keyboard-selectable speeds of 4.77 MHz and 9.54 MHz. Options include a second floppy disk drive, an internal modem, an electroluminescent (EL) backlit screen, and a 256K RAM memory board.

For the *Snap 1+1*, which starts at \$2,095, *Datavue* takes a unique approach to expandability. As the name suggests, the computer is composed of two snap-together modules. The laptop module weighs in at a featherly 5

## dBASE Communications Program Provides Automatic Remote Data Input

Even the most powerful database program is slowed to a virtual crawl by cumbersome, manual data entry. *FastComm Systems' dComm->Link* allows direct data entry from remote systems and external devices into any database such as *dBASE III PLUS* that supports Ashton-Tate's storage and management standards.

Dial-up computer systems and remote databases are among

the sources that can be connected to a database system using *dComm->Link*. The program can also be set to place calls for automatic downloading.

**List Price:** *dComm->Link*, \$295. **Requires:** 512K RAM, hard disk; not copy protected. *FastComm Systems* Inc., 1704 22nd St., Santa Monica, CA 90405; (213) 399-5511.

CIRCLE 433 ON READER SERVICE CARD

## Disk Drive Controller Board Supports a Variety of Formats

*Computer Peripherals* says its \$249 disk drive controller board is compatible with both old and new IBM PCs, XT's, and AT's. The *Drivemaster* operates 5¼-inch and 3½-inch disk drives and both 360K-byte and 1.2-megabyte media. The card supports 48-, 96-, and 160-track-per-inch read/write formats.

**List Price:** *Drivemaster*, \$249. *Computer Peripherals* Inc., 2635 Lavery Ct., #5, Newbury Park, CA 91320; (800) 854-7600.

CIRCLE 434 ON READER SERVICE CARD



*Datavue* Corp.'s 9-pound *Spark* has a surprising array of features considering its \$995 price tag.

total RAM, dual 3½-inch floppy disk drives, blue super-twisted-crystal screen, \$2,095; optional modem, \$325; electroluminescent backlit screen, \$125; orange gaslight screen, \$300. *Snap 1+1* with 20-Mbyte hard disk and orange gaslight screen, \$3,795. *Datavue* Corp., 1 Mecca Way, Norcross, GA 30090; (404) 564-5555.

CIRCLE 432 ON READER SERVICE CARD



# First Hayes-Compatible Modem For the PC Convertible Arrives

## PC HANDS ON

BY JON PEPPER

The EasyTalk 1200 from Megahertz Corp. is the first replacement modem for the much-maligned IBM PC Convertible to come to market. While it can't do anything for the rest of the laptop's problems, it at least brings the modem in line with the Hayes standards.

As a rule, internal modems are not terribly exciting—you install them and they unobtrusively perform their function. Installing the EasyTalk, however, presents more than its share of adventure. The documentation devotes eight pages to this somewhat intimidating task, which requires disassembling a healthy portion of the Convert-

ible. You need to remove any add-on modules installed and then pry the back open; next, take out the battery pack and a circuit board, lift out the keyboard, and slide the top cover out of the way.

The modem consists of two circuit boards that connect with a ribbon cable. One contains the phone jacks and is a bit tricky to get in place, while the other board easily slides into place. Then all you have to do is get the whole thing back together.

In all fairness to Megahertz, the company did the best it could with what it had to work with. There is really no other place for the modem to go, and any installation difficulties are really the result of the Convertible's poor design. With luck, it is possible to get the whole thing

done in about a half-hour.

The modem has to be powered up by software control in order to conserve DC power. The company provides a disk with the utilities needed to turn the modem power on and off, and you can include them in a batch file or as a device driver.

Once all the prologue was out of the way, the operation and performance of the product were fine. The EasyTalk is Hayes compatible and performed without difficulty using popular communications packages like Microstuf's *Crosstalk*.

If you happen to have a PC Convertible, the EasyTalk 1200 should take care of your modem needs. The price is in line with internal modems for other portables, and a 3½-inch version of *Crosstalk* is included.



## PC FACT FILE

**EasyTalk 1200**  
Megahertz Corp.  
2681 Parley's Way, Building 2-102  
Salt Lake City, UT 84109  
(801) 485-8858  
List Price: \$400

**In Short:** Hayes-compatible 1,200-bit-per-second internal modem for the IBM PC Convertible.

CIRCLE 427 ON READER SERVICE CARD

# CoreFast: Easy File Backup with Error Check, Data Verification

## PC HANDS ON

BY WINN L. ROSCH

Backups are still the best insurance against hard disk damage and accidental file deletion. With that in mind, Core International supplemented its highly reliable disk subsystems with its CoreTape streaming tape system. When CoreTape gained instant approval, Core adapted it to make *CoreFast*, a software-only product that backs up any DOS disk—floppy disk or removable or nonremovable hard disk—to nearly any other DOS disk without the need to buy expensive hardware.

*CoreFast* handles both file-by-file and image backups and restorations, an improvement over DOS's standard BACKUP and RESTORE utilities. Although image backups can only

be restored to disk partitions identical in size to the original, the software allows file-by-file restorations of an image backup to nearly any disk, the only limit being 250 files per session from image backups.

File-by-file backups can be made at either of two speeds. In DOS mode, *CoreFast* puts backups on any device using the standard DOS format for that device.

High-speed mode uses a special *CoreFast* format on double-density and high-density floppy disks.

My tests found *CoreFast*'s DOS mode to be no swifter than the DOS COPY command, but high-speed mode proved almost three times faster. One megabyte was backed up to a high-density floppy disk in about 20 seconds, the same speed that some "fast" backup utilities do

ordinary 360K-byte floppy disks.

*CoreFast* runs in either command- or menu-driven mode. The latter relies heavily on function keys to select operational parameters and gives context-sensitive help at the press of F1.

Setup and operation are facilitated by unusually good documentation, possibly the best in this product area.

All of the various DOS backup options are available in both modes—you can select files for backing up by date (with the choice of before or after the given date) or by archive bit, and subdirectories can be searched at your option. A cataloging feature allows you to specify groups of files to be backed up (or restored) automatically.

An additional utility puts your system in wait mode to make backups at an appointed

## PC FACT FILE

**CoreFast**  
Core International  
7171 N. Federal Hwy.  
Boca Raton, FL 33431  
(305) 997-6055  
List Price: \$149

**Requires:** 256K RAM, 360K or 1.2-Mbyte disk drive, DOS 2.0 or later.

**In Short:** A high-speed, software-only, menu- and command-driven backup system that makes file-by-file and image backups and restorations from nearly any DOS disk to any disk (with some restrictions). Not copy protected.

CIRCLE 421 ON READER SERVICE CARD

time, but because it runs in the foreground you can't use your PC while it's waiting.

These and other features, such as an optional error-correcting protocol and a verification procedure that ensure backup integrity, make *CoreFast* a worthwhile alternative in the crowded backup market.

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## ■ QUICK LOOKS

## Star Trek Game: Frustrated in Space



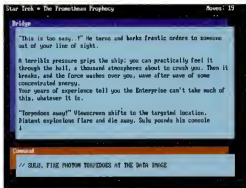
HANDS ON

BY MITT JONES

Simon & Schuster Software's new text-based game *Star Trek: The Promethean Prophecy* puts you at the helm of the Federation Starship *Enterprise*. As Captain James T. Kirk, your mission is to find food on the planet Prometheus for the crew of the *Enterprise*.

You are free to give orders, move about, and ask questions through an English-like command scheme. The crew's dialogue is colorful, and each character behaves and speaks as you might expect.

But you soon discover there is little intelligent life in this game. Even when you follow the game's command scheme



As the adventure unfolds in *Star Trek: The Promethean Prophecy*, you must issue commands (bottom of the screen).

exactly, you are rarely able to do what you like; only certain responses are allowed at each

point, yet you are never shown the choices.

The result is a frustrating se-

quence of trial and error. Though clues are strewn throughout the plot, they are few and far between. After finding one clue, your best hope is to wander about the planet's surface for another 15 minutes until you are thrown another morsel.

Fans of interactive fiction may appreciate the game's logic, but I found *The Promethean Prophecy*'s use of artificial intelligence techniques lacking.

If patience is among your virtues, you love "Star Trek," and you have time to burn, this game is for you.

**List Price:** *Star Trek: The Promethean Prophecy*, \$39.95.

**Requires:** 128K RAM, DOS 2.1 or later. Not copy protected. Simon & Schuster Software, 1 Gulf + Western Plaza, New York, NY 10023; (800) 624-0023.

CIRCLE 430 ON READER SERVICE CARD

## Cruise Control: Speed at Hand



HANDS ON

BY BILL MACHRONE

Revolution Software's *Cruise Control* is a well-thought-out keyboard accelerator that can vary the repeat rate from a snail's pace to the stratosphere. It also has a screen blunker, but I hate screen blunkers. They

make me think my computer has just died.

Speed aside, keyboard accelerators need to do a number of things if they are to work well. First, they must be adjustable. Second, they must respond to key-up as well as key-down conditions. Third, they must have installation options if they are to work successfully with a

wide variety of programs.

*Cruise Control* succeeds on all counts. Even at the fastest speeds it stops on a dime when you lift your finger from the key; there's no overshoot. It sports five installation schemes, one of which is likely to work with your favorite programs. It's easy to tune *Cruise Control* to your pace and then set that

speed in a batch file for future use. Furthermore, you can override the default setting while you're using it. I especially recommend it to *Microsoft Word* users.

**List Price:** *Cruise Control*, \$39.95. **Requires:** DOS 2.0 or later. Not copy protected.

Revolution Software, 1715 Route 10 East, Randolph, NJ 07869; (201) 366-4445.

CIRCLE 428 ON READER SERVICE CARD

## MoneyMate: For the Game of Life



HANDS ON

BY LOREN AMSDEN

*MoneyMate* home financial software from RealWorld Corp. is the latest entry into the personal money-management category that *Andrew Tobias' Managing Your Money* has dominated for years. The deluxe edition of *MoneyMate* comes in a long, flat box that looks like it contains a board game. Open the box, and it still looks like a board game. What

appear at first to be crib sheets for the players are, in fact, pre-labeled, color-coded file folders for such things as bank account activity and (yuck!) unpaid bills.

What looks like a deck of cards turns out to be a pocket notebook for tracking cash transactions. There are even self-linking "Entered" and "Paid" stamps.

The basic functions of bank account, credit card, and cash transaction tracking and reporting are quick and easy to use,

with well-thought-out help screens.

The list of income and expense categories included for purposes of cash-flow tracking and planning is very complete and clearly oriented toward the individual or family.

If the portfolio management and financial calculator functions of *Managing Your Money* (which is \$30 more) are of no interest to you and if an office supply store is one of your favorite places to spend time, *MoneyMate* is worth a look.



If you're the type who likes to stamp bills "unpaid," *MoneyMate* is for you.

**List Price:** *MoneyMate*, \$169.99.

**Requires:** 256K RAM, DOS 2.1 or later. Not copy protected. RealWorld Corp., Concord, NH 03301; (603) 798-5700.

CIRCLE 429 ON READER SERVICE CARD

# Corporate Maneuver.

In the high-pressure corporate environment, every move counts. It's no wonder, then, that many corporate PC users are reaching for WordPerfect for powerful word processing.

## Reaching the top.

WordPerfect is now the best-selling word processor for the IBM PC, according to market research firm InfoCorp. And customers like Ford, Chrysler and TRW are leading the way.

## Meeting user needs.

But WordPerfect's climb to the top was no overnight success story. For the past three years, user feedback has been applied to each new version of WordPerfect, pushing it closer and closer to perfection.

The result is WordPerfect 4.2, a word processor with unsurpassed business features for the IBM PC and compatibles. Features like an elegant thesaurus, a 115,000-word spelling dictionary, document summary, columns displayed side-by-side on screen, windows, line drawing, statistical typing, and extensive printer support.

## Make your move.

There is a word processor that is as productive for executives as it is for secretaries. WordPerfect 4.2. It's the consummate corporate maneuver. For more information, call or write WordPerfect Corp., 288 West Center St., Orem, Utah 84057, (801) 227-4000.

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**Downloading a mainframe application?** ECM memory runs with any program that uses DOS for screen services including RM and MS FORTRAN and MS and LATTICE C! This means you have an additional 384K available for oversized applications. Programs which write directly to the screen require a simple patch to adhere to the new standard. MicroWay has already developed patches for the Lotus, WORDSTAR and AUTOCAD screen drivers. Release 1A of 1-2-3 jumps from 535,516 to 916,444 bytes available and runs faster than Release 2 for most worksheets.

**Number Smasher/ECM is 100% compatible** with all hardware and software including EMS and EGA boards. The compatibility is a result of control: its speed is switch, keyboard or software selectable from 4.77 MHz to 12.0 MHz. Applications which have not been upgraded to ECM can still be run by setting DOS to 640K or 704K and using the memory above DOS for I/O enhancers.

**Number Smasher/ECM runs floating point bound programs faster** than an AT or any other 80286 based machine. In fact, Number Smasher's 12 MHz 8087 runs a factor of three faster than the standard 80287 on the AT, delivering up to 125 kflips. Software is included for RAM Disk, print spooler, and disk caching, which speeds up floppy and hard disks by a factor of 2 to 10!

**Number Smasher/ECM is the most cost effective productivity tool you can buy.** The base board which runs at 9.54 MHz comes with 512K and costs only \$599! The complete system which includes a motherboard accelerator, one megabyte of memory and a 12 MHz 8087 is just \$1199. Call today to discuss your particular configuration. Remember: "The advantage of buying from MicroWay is outstanding personal service." (PC Magazine, 6/10/86 - p. 162)

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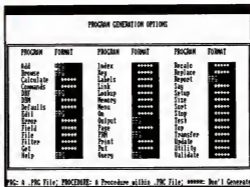
# Quickcode Plus Generates Fast, Versatile dBASE Programs

**PC HANDS ON**

BY GLENN HART

Fox & Geller's original *Quickcode* was one of the first, and probably the most successful, program generators for the *dBASE* family of database managers. While impressive for its time, both *dBASE* and competitive program generators (most noticeably *Bytel Corp.'s Genifer*) have improved greatly. *Quickcode Plus* retakes the leadership of the category.

Unlike earlier F&G programs, *Quickcode Plus* is not copy protected, and installation is a breeze. 1-2-3-style horizontal menus are used in *Quickcode Plus* itself and the programs it generates. The command structure is not always straightforward. The 1-2-3-like menus are quite worthwhile, however the overall interface is complex and



After defining fields, you select options from *Quickcode Plus's* repertoire of 43, reports are available only with a separate program.

is complex and nonintuitive.

Your primary job is to define a form containing the fields in your database. You simply position text and identify field locations and characteristics.

Forms can be up to 11 pages long. You can draw boxes and lines, point color into an area, and use graphics characters to dress up the screen. You can also create customized horizon-

tal and vertical menus.

*Quickcode Plus* adds several data types—like money, telephone, and Social Security numbers—to *dBASE's* standard collection. You can use *dBASE III's* Pictures utility, but the *Quickcode Plus* manual doesn't explain them at all. Nor does it explain the plethora of functions you can use to validate entries. Similarly, you can use *dBASE III Plus's* Query and Filter features, but you'll have to understand *dBASE's* sometimes complex syntax.

*Quickcode Plus* adds a very useful lookup function that opens a database of your choice, finds a record using a key and index file, and then retrieves the value in any field or expression you ask for. Another terrific *Quickcode Plus* function is "virtual," which lets you call and pass parameters to a program you have written and use the value it returns for computations or validations.

*Quickcode Plus* is fully relational and lets you link up to four other data files to your main file. You can also update

(continues on page 54)

# Pdisk: A Grab Bag of Hard Disk Utilities

**PC HANDS ON**

BY STEPHEN RANDY DAVIS

Billed as "advanced disk utilities," Phoenix Technologies' *Pdisk* is a disk full of basic utilities that DOS should have provided but didn't. *Pdisk* offers short programs that provide a disk cache, several directory tree functions, a file Move command, an improved backup and restore function, and a hard disk Park utility.

Though not a complete disk management program (like *X-Tree*) or a DOS shell (like *1 DIR*), *Pdisk* is a set of utilities that will come in handy for disk management chores; some, such as the caching program and the Move command, are likely

to become daily timesavers.

All of the *Pdisk* utilities can be invoked from the DOS prompt. Remembering all of the available command switches can pose a problem, but there is a shell program along with a point-and-shoot command line for simple access to the numerous options.

## Hard Disk Speedup

The Cache utility can be instructed at boot up to set aside a portion of internal RAM as a disk cache into which the most recently read sectors are buffered—a process that can drastically improve hard disk speed. Unlike most other cache programs, *Pdisk's* can use any combination of extended, expanded, and conventional RAM. One innovation, though,

is of questionable value: the cache will postpone disk writes if the system is too busy at the moment, remembering to write when the system is free.

*Pdisk's* tree utilities do to directories what DOS's simpler commands can do to single files. For example, *TreeCpy* can copy an entire directory, including all of the files in that directory, in one command. *TreeDel*, *TreeCmp*, *TreeDir*, and *TreeRd* perform similarly. There are no single-file delete commands, which prevents *Pdisk* from becoming the kind of hard disk housecleaning tool it comes close to being.

## Rapid File Switching

The tool you are likely to regard as most valuable is *Move*; this utility rapidly switches files from one directory to another by rewriting the directory entries rather than reading and rewriting the file data. *Abacomp* and *Arestore* attempt to provide an easier-to-use, more powerful backup capability than that

**PC FACT FILE**

### Pdisk

Phoenix Technologies  
320 Norwood Park South  
Norwood, MA 02062  
(800) 344-7200

List Price: \$195

Requires: DOS 2.0 or later.

In Short: A collection of utilities absent from DOS. Only the caching program stands out. Not copy protected.

CIRCLE 422 ON READER SERVICE CARD

which is available with DOS. The Park utility provides a hard disk for power down by positioning the read/write heads over an unused section of the disk.

*Pdisk* comes in a standard IBM-size three-ring binder. Documentation is provided for each utility in separate chapters. A quick-reference card is also provided.

# How to choose an online service

Online services make your PC come alive. But before you settle on one, here are some helpful tips.

## 1 What are you going to need it for?

Some services cater primarily to investors, while others are trying to be *all* things to *all* people. The Source, on the other hand, offers a carefully developed blend of sophisticated communications tools, easy-to-find information and active Special Interest Groups that can be used for business support, personal enjoyment and household education.

## 2 What will it cost to learn?

After you find a couple of services that seem to fit your needs, ask about their tutorial offerings. If they don't have any, forget it. Beware of services that offer free connect time without a tutorial. This time gets used up fast and then you're on your own.

The Source has a free, award-winning tutorial that's an easy, step-by-step guided tour of services including business and investing, travel and communications. It gives you all the time you need to learn because there are never online charges for the tutorial.

## 3 Check out the customer support staff.

Can you get through to them easily? Are they helpful? Do you like them? Ask tough questions about the service and see if they can handle them. Our customer support number is 1-800-336-3330, by the way.



The Source is a carefully developed package of easy-to-use online services including electronic mail, computer-to-computer conferencing, travel services, business and investing information, Special Interest Groups, electronic bulletin boards, news, weather and sports, education, games, shopping and more.

## 4 Be sure you get your money's worth.

This is tough sometimes. Services that advertise that they cost less, can end up costing more. Services that look like they offer everything can be a disappointment when you join and have to pay extra for the services you really wanted.

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## ■ COMMUNIQUE ■ EDITED BY BILL HOWARD



## PC Magazine Reviews the Zenith Laptop

See it first at WOLFF Computer

### Dazzling Blue Z-181: Most Usable Laptop

BY PAUL SOMMERSON

Your friendly IRS brought



speedy 3 1/2-inch, 7 pop-up shock-mount drives, 640K bytes of RAM, a respectable keyboard with a shaped cursor pad, put, a rechargeable battery, a built-in modulator and parallel po

Why is this man not smiling at the New York Times reprint of his PC Magazine review? Perhaps because his name is Paul Somerson.

### Exclusive! For You (and You and You...)



A southwestern public relations firm sent PC Magazine the following confidential, eyes-only tip via MCI Mail:

"Rumor: Please protect our source and us as a source—we've learned that AST is coming up with a 386 accelerator card for ATs. Also, there may be as many as a dozen companies coming up with 386 DOS packages and that Microsoft people are apparently starting to pay visits to them."

According to the MCI message header, the confidential tip went to 26 addresses.

### Quickcode

(continued from page 52)

as many as 54 different records in many different databases.

Perhaps the weakest territory is defining reports. Only the standard dBASE III Plus report generator, with all its limitations, is available. The menu offers Fox & Geller's excellent Quickreport report generator as a choice, but you have to own the \$295 program to exercise this option.

The program-generation process itself is very fast. You can set up the overall environment

you want, customize details, and choose which programs to generate from a long list—the program suite that Quickcode Plus creates can consist of up to 43 programs!

The "proof" of any code generator "pudding" is the quality of the code produced. Quickcode Plus's code is well structured and heavily documented. It uses all the tricks and slippery features of the newest release of dBASE III Plus to good advantage (so much so that it's not easy to compile the resultant code with other third-party compilers, most of which

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—Classified ad, Fort Lauderdale Sun Sentinel, October 29, 1986

Heard or seen anything offbeat, unusual, or just plain dumb about the computer industry? Send your offerings to Communiqué, PC Magazine, One Park Avenue, New York, NY 10016; (212) 503-5293 or MCI Mail 157-9301.

Contributors will receive \$50 and a PC Magazine T-shirt. Contributors for this issue: Patricia Phelps (hotel help-wanted ad), John Darrow (leather-quality printer), Jim Seymour (pin-up), Paul Somerson (New York Times reprint), and Joseph Polidoro (MCI Mail message).

### Miss February

Good taste never goes out of style. And vice versa. This California manufacturer said its ad, in life-size cardboard-cutout form (with the teaser line, "Finally! Technology does not have to cost an arm and a leg...Stick it in your IBM!") was "the talk of Comdex." And possibly the talk of the legal department: "PC Tutor" is a registered trademark of PC Magazine. But nobody has yet registered Lotus I, II, III.



don't fully implement every new dBASE feature).

Quickcode Plus is a tremendous advance over Fox & Geller's previous code generator. The programs it creates are competent and solid, and you can modify the program's methods and the code it creates somewhat easily if you know what you're doing. Quickcode Plus is not really for true dBASE novices, though. You'll need to know dBASE rather well, and any serious reporting requires an external report generator. All in all, though, Quickcode Plus is an impressive product.



### FACT FILE

#### Quickcode Plus

Fox & Geller Inc.  
604 Market St.  
Elmwood Park, NJ 07407  
(201) 794-8883  
List Price: \$295

Requires: 384K RAM, dBASE III Plus, DOS 2.0 or later.

In Short: Excellent dBASE program generator. Not copy protected.

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## In the new world of the IBM Token-Ring network it's nice to see an old familiar face.

The Token-Ring LAN is a reality. It shouldn't surprise you that IBM<sup>®</sup> was the company that developed it. It should be equally unsurprising that the technology that best allows the Token-Ring to communicate with the mainframe comes from DCA, the makers of IRMA.<sup>™</sup>

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Report generator	NO	<b>YES</b>
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**T H E R E S E A R C H G R O U P**

CIRCLE 102 ON READER SERVICE CARD

■ FROM THE EDITOR'S SCREEN ■ BILL MACHRONE

# SHOULD YOU BUY AN 80386?

*The recent spate of new product introductions has left users confused. What are the risks of jumping into the 80386 fray now? And what effect will the next version of DOS have?*



Users have three big concerns about the 80386: speed, compatibility, and the future. They want to know if they're making a sound decision. They also want to know if it's time to sound the death knell for the 8088. If you need the speed, the 386 is there, now. Twice as fast as an 8-MHz AT is nothing to sneeze at. If you want it, you pay for it.

Remember that we've barely heard the 80386's first shot regarding speed. We certainly haven't heard the last shot from the 80286 either. The 80386 is designed for ultimate speeds of 24 MHz, 50 percent faster than today's chips. But clock speed isn't everything. Most of the designers out there are gunning for Compaq. One of the ways to make the machine go faster is to use fully static memory, as demonstrated by PC's Limited's upcoming model. Static memory never has to wait for a refresh and is much simpler to decode than the more common dynamic RAM. It also generates almost no heat and much less radio frequency interference. Unfortunately, it's much more expensive and takes up considerably more space.

On the 80286 side, we have not yet seen the first downsizing of the chip. The "shrink" is a process that most popular integrated circuits go through in their life cycles. By making the spacing between the elements of the chip smaller, the designers can make it go faster. Interestingly, Intel isn't doing this. One of its licensees, AMD, is. It's looking at 80286 speeds in the 16- to 20-MHz range. That far outpaces the 8088—another nail in its coffin. It also heavily overlaps the 80386, creating

more confusion. Which to buy? Faster 286-based machines or 386 machines?

The PC AT is very much a known hardware quantity. It's relatively easy to build a compatible. The 80386 requires some adaptation for its bus timing to be compatible with the PC AT. That's not a bad thing, but it will doubtless cause stumbling blocks down the road. Here's why:

**STUMBLING BLOCKS** Until now, the BIOS (Basic Input/Output System) has been the path to compatibility among machines. It contains standard routines that enable software to talk to the hardware. But the BIOS was written with the assumption that the PC would not be asked to do more than one thing at a time. However, 286 DOS will be a multitasking operating system. It will place strong, new demands on I/O routines. The biggest task is reentrance. That means that the I/O drivers have to be written so that they can inter-

rupt in one task, perform another, and pick up the original task where they left off. The existing ROM BIOS can't do this. The existing ROM BIOS is dead.

286 DOS will have to talk to the hardware directly, with its own reentrant BIOS-like routines and device drivers. That's no big deal in terms of talking to machines that are very, very similar to IBM's PC AT. But machines that have depended on their BIOS code to bridge the gap between what DOS expects and what the hardware actually does are in for trouble. I doubt that 286 DOS will run on them until it is modified and ported to them. I also suspect that the 386's hardware environment is just different enough that it too will require a separate port.

If we accept the supposition that 286 DOS is a product that Microsoft is doing for IBM, where does that leave the compatible vendors? Does Microsoft have a parallel development program that will make porting 286 DOS to non-IBM machines easy? If history is an indicator, yes. Microsoft offers generic versions of DOS to compatible manufacturers, although at a price. Those with good BIOSs have been able to sell copies of IBM PC-DOS with their machines, but that will probably no longer be possible with 286 DOS.

How many compatible manufacturers will be able to clone the IBM hardware environment well enough to run unmodified 286 DOS? How many of them will want to ante up to Microsoft or one of the compatibility houses such as Phoenix Technologies? Will they open themselves to copyright infringement lawsuits? 286 DOS



## ■ FROM THE EDITOR'S SCREEN

may not be an IBM-proprietary product, but it will certainly help to separate the big leaguers from the amateurs. The big guns will all have official 286 DOS ports. Anything else would be suicide.

If I were a second-tier compatible manufacturer, I would pay for a port of 286 DOS to add to my next hardware design. After all, the market is still growing, and the real action is in the 286 and 386 ma-

chines. I wouldn't do anything that would cut me out of the next wave. But I'd have serious doubts about redressing potential incompatibilities between new versions of DOS and my installed base.

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CIRCLE 106 ON READER SERVICE CARD

**FUTURE SUTURE** Buying an 80386-based machine from any of the big guys looks like a safe bet today. They'll make dam sure that future versions of DOS run on it. Same goes for 80286 machines. 286 DOS will likely go through the same improvement cycles as DOS 1, 2, and 3. The 80386 version of DOS strikes me as a separate product, one that doesn't replace 286 DOS but capitalizes on its strengths to do even more. To some extent, people's expectations for the 386 may be overblown. For example, there has been confusion over virtual 86 mode. It simply permits the chip to imitate multiple 8088-based machines while it is also running in protected mode. It is most emphatically not the host

■ The 80386 is designed for ultimate speeds of 24 MHz, 50 percent faster than today's chips.

to a virtual operating environment in which we can run multiple protected-mode operating systems. We'll have to wait for the next generation of microprocessors for that.

While virtual 86 mode is wonderful for extending the life of today's software, it's merely a bridge to the next versions of our favorite packages. That's the one big advantage that the 386 offers over the 286. Future applications software will need the 386 in time; for the moment, it hasn't yet begun to exploit the 286.

Machines based on the 386 will likely carry a premium price for the foreseeable future, on the order of \$1,000 over the price of an equivalent 286. Is the increment a hedge against obsolescence or is it money we could put to work more profitably while we're waiting for 386 software? You decide.

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■ JOHN C. DVORAK

# IBM'S PC II: FIASCO IN WONDERLAND



*IBM's introduction of the long-awaited PC II—disguised as the PC-XT Model 286—confirms that the Entry Systems mavericks finally have been emasculated by the corporate lifers.*

**R**emember the PC II? Last year the rumors flew until IBM denied its existence. Well, if you haven't noticed, it's here. Unfortunately, because of marketing blunders by IBM, it's called the PC-XT Model 286. It is the PC II, isn't it?

Most observers agree that the XT Model 286 is the PC II. After all, it meets all the early leaked specifications. If this is true (and I think it is), then IBM blundered badly when it introduced the machine with the XT Model 286 moniker. I expect this to be par for the course in the years to come: major marketing screwups by IBM.

Let's look at the XT Model 286 as a case study.

It started with rumors, then eager anticipation. It was to be the great PC II. Then it never came. Somehow, a year later, we get a boring machine in the wrong box—the XT Model 286.

Suppose something like this happened in the automobile world? Let's say there is a lot of anticipation about a hot new Corvette. Everyone eagerly awaits the new car. Then GM says there will be no new Corvette. It lets a whole year pass and releases the car as an Oldsmobile. On top of that, it isn't released as an Oldsmobile sports car, but as a Ciera with high-tech innards? Now, would you call this sharp marketing prowess?

I don't think so.

**QUICK FIX-IT** I'm amused by Ariel Corp. and its fix-it kit for the XT Model 286. It sells a kit to drop these machines into a Taiwanese AT box. Cost: less than \$50. Advantage: it can now use big AT

add-in cards. For a few more bucks you can plug in a speedup kit and have a 10- or 12-MHz AT for about \$1,000 less than IBM's 8-MHz AT. Gee, a real PC II.

So what is going on in the IBM marketing department? Who knows? Perhaps IBM should simply turn its marketing over to the typewriter boys and let them have at it. It was those sharpies, remember, who stole the office typewriter market with a mechanical nightmare—the IBM Selectric. They did it with support, sales, and a touch of merchandising—by which I mean they actually sold the Selectric in a variety of colors to match office decor. The PC family of computers should also be made available in decorator colors (there is no reason they should all be the color of a decaying skeleton—an insipid beige).

Of course, IBM isn't the only company that has failed to modernize its look. The automobile industry peaked in the late 1950s with two-tone and three-tone paint

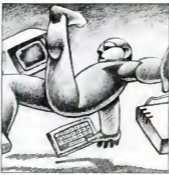
jobs. The paint schemes were deemed too expensive by some late-arriving bean-counters. But that's a subject for another essay.

**NO LONGER THE LEADER** Let's get back to the issue. In a nutshell, it is obvious to even casual observers that IBM will no longer lead the way in the personal computer game. At least, not until things once again settle down—perhaps not even then, since the Entry Systems Division (the one responsible for the success of the PC) has been emasculated. So, mindlessly following the lead of IBM may now be a big mistake.

The old Don Estridge Entry Systems Division in Boca was one of those renegade operations resembling legendary WWII outfits, popularized by TV shows like "McHale's Navy" and by writers like Pappy Boyington and his Black Sheep Squadron. These were mavericks who made things happen and got things done but irritated the uncreative, entrenched, sheepish lifers, who resented their freedom and verve.

Typically, the loathsome opposition to creative freedom-seekers spends its time (and company time) dogging these fellows until it gets them kicked out of the company (or kicked upstairs). Devoted lifers have one big advantage in this battle—time is on their side.

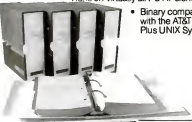
I don't know how the lifers retook their positions of power at IBM, but it's time we recognize that they have. IBM is back to "situation normal." And we'd better remember that!



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M I C R O P O R T

■ JOHN C. DVORAK

# INSIDE TRACK

*Cure for the 3½-inch blues, memory-resident mania, "sluggish" chips, and the FCC show-stopper . . .*

Yes, the **Zenith Z-181 Portable PC** is the sexiest machine sold. With its blue-light display, it's especially attractive when used in a darkened airplane. But as with the Toshiba and now the NEC, the 3½-inch disks are **inconvenient** when neither Zenith, Toshiba, nor anyone else has time to offer the add-on 5¼-inch disk. "Golly, we're too busy meeting demand for the laptops," they'll tell you.

Well, forget the add-on disk drive. Buy the **Brooklyn Bridge** from White Crane Systems. I seldom use a word like *fabulous* when describing a product. This thing is **fabulous**. I had a hunch that it would be a superb product when I read the letter I got from Dr. Guy Gordon, the inventor of this mininetwork, who called it "his baby." It's a combination cable and software package that hooks the Toshiba or Zenith (and, I assume, a lot of other MS-DOS machines) to your PC, XT, or AT via the serial port and allows you **full access to all the disk drives** of both machines for effortless file transfer (at 115K bits per second). It allows your Toshiba T1100, for example, to use the hard disk of your AT as though the two were directly attached.

Installation is a snap. It works first time out, no glitches. It's transparent. It's great. And since it's priced at \$129.95, it **would be silly** to buy an add-on drive for your MS-DOS laptop. Call the company at (404) 454-7911 or write them at White Crane Systems, 6889 Peachtree Ind. Blvd., Norcross, GA 30092. My highest recommendation.

**Reductio Ad Absurdum** (or Now I've Seen Everything) Dept.: Every now and then a guy takes an idea to the logical extreme. Check out *Stay-Res* from MicroHelp, 2220 Carlyle Dr., Mar-

ietta, GA 30062; phone (404) 973-9272. **It makes your compiled BASIC programs memory resident!** Egad! It costs \$95 and works with QuickBASIC and BASCOM.

I see in MicroHelp's flyer that it uses the ugly phrase "terminate and stay resident." To me that always sounds like a **sick combination** of an old-age home and mausoleum. Don't use this term! We all know what "memory resident" means. (Some jerk always says, "Well, DOS is memory resident, isn't it?" My message to him: get a haircut!)

**Final Comdex Report:** The most interesting booth at the show was run by the **FCC!** The agency was at the show to crack down on the proliferation of unapproved computer devices that emit far too many radio signals. "It's getting ridiculous," says FCC director J.J. Freeman. "We have to take action now before it gets out of control." Freeman was requiring vendors of unapproved products to post an FCC sticker on the equipment saying that it is unapproved. "The problem is that nobody takes us seriously. We post the sticker and 10 minutes later the vendor plops it into a drawer," says Freeman, indicating that many vendors **couldn't care less** about the laws.

Many of the vendors complained that their equipment works fine but isn't approved only because of some bureaucratic paperwork. **The FCC is just harassing them**, say these people.

Whatever the case, it looks as though the FCC will be a **permanent part** of Comdex. The good news is that the FCC announced a public access link for manufacturers and users who need to find out the status of authorizations. By using a modem and calling the **FCC computer** at (301) 725-1072, a person can query

the agency about the status of computers and whether they are legally approved.

When I talked about this with a clone seller, I was told that many Taiwanese companies are shipping a **roll of bogus "FCC approved" stickers** with the computers along with a little booklet telling where to attach them.

**Sixth-Generation Computers Dept.:** If you haven't been following the latest in biotechnology, then you should know that Bell Labs is working on **biological computers**. Apparently it has somehow **hooked together a bunch of slugs** in such a way that they can make a NOR gate or something.

Already there have been two annual events dubbed the **Neural Circuits for Computing Conference**. This field will be a big deal because the theoretical density for a neural circuit is an order of magnitude greater than that of silicon.

Anyway, AT&T's slug-based CPU opens up lots of possibilities. Remember back in the good old days when you heard how iron filings tossed into the core memory would bring down a system? To ruin these new machines you can **toiss in some salt!** And talk about a new meaning for "the system still has some bugs in it." When they say some programs run as slow as a snail, they'll really mean it.

The key to financing these living computers will have to be the Department of Defense. I'm sure you could convince some general that with the right genetic engineering, a **fly could be turned into a high-speed CPU and image processor**. Think of the possibilities. Release the fly in the Kremlin and have it fly around and record bit-mapped images of secret Russian documents. It could download the photos after its return to base. When the fly came in for repairs, you wouldn't know what to think if a friend came in, spotted the disassembled bug, and said, "Hey, John, your fly is open!" (Groan!)

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# BOB STANTON HAD A GREAT IDEA. AN HOUR LATER HE WAS TESTING IT.

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CLARION knows that a PC monitor is refreshed from memory, so it treats a screen layout like a group of variables. Just move data to a screen variable, and it shows up on the monitor.

Bob set up dimensioned screen variables for the days of the month and a screen pointer for selecting a date, and he was done. Then Screener generated the code.

Then Bob drew the appointments window, built an appointment file, filled in the connecting code and tested it — **ONE HOUR AFTER HE STARTED!**

Testing was a breeze. Screener doesn't just write code, it compiles your source, displays a screen, gets the changes, then replaces the old code in your program.

So here are Bob's appointment screens. You can see the source listing to the right. We marked all the code Screener wrote for him.



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■ PETER NORTON

# INDUSTRIAL-STRENGTH PROGRAMMING



*The difference between "convenience" programming languages such as BASIC and "professional" languages like C is no joke for programmers trying to make the switch.*

Before I continue with my three-part series on the revolution in programming languages, I'd like to turn to a few related issues brought up in a recent letter from *PC Magazine* reader Donald Granger. Next issue I'll close out the series with a look at Microsoft's CodeView.

Donald wrote that he has been programming in BASIC and in Turbo Pascal and that he's now making the jump to C. That's a classic case of the phenomenon we've been discussing, the major sea change from other languages into C. Don's move is not only representative of what's going on among PC programmers, it's exactly on target with what Microsoft's market research about programming languages found: the typical new convert to C comes with a healthy dose of Pascal experience, as well as BASIC.

**PASSING THE BATON** Don also chose wisely in picking Microsoft C, Version 4.0; it's clearly the best C available. Although I've long been a fan of Lattice C, I believe the baton of leadership in C compilers has now passed to Microsoft. Program development at the Norton Computing factory has switched from Lattice to Microsoft C, and it's likely to stay that way. (Take that as a challenge, Lattice: if you or anyone else can improve on MS-C, Version 4, you'll win us back, gladly.)

Don Granger switched to the best professional tool there is for serious PC program development. And then he discovered an ugly truth: professional tools are different.

Here's Don's lament:

"I'm making the jump from Pascal and BASIC to C and am going nuts trying to figure out how to do such simple things as CLS, LOCATE, and set COLOR. I have been told that I have to write ASM routines to do these routine things. Only problem is that I do not know ASM!!!"

There is, actually, a very simple solution to Don's problem, and that's to turn to one of the high-quality service libraries, such as Blaise Computing's C Tools Plus. These programmer's routine libraries are designed to solve that very problem. They let you use the wheel—a whole garage full of wheels—instead of reinventing the wheel.

These libraries have three major benefits. The most obvious one is that they save you from having to learn assembly language programming and the arcane ins and outs of interfacing with DOS and the BIOS. The second reason is that they save you a lot of work, work you'd have to do

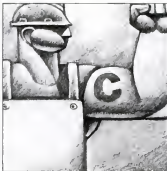
even if you had the necessary assembly language programming skills (which, like Don, many good programmers don't have).

The third reason for using these libraries is that, in many cases, their routines do it better than yours could. After all, if these things weren't well written, who would buy them? For programmers like the crew at Blaise, writing these libraries well is a full-time job. For people like you and me and Donald, these routines are the means to another end, and a nuisance besides.

So, it's libraries to the rescue, at least to reduce some of the grief of switching from a user-convenient language like BASIC to a professional's language like C. But while these commercial libraries can take care of some specific problems like, How do I clear the screen (CLS), move the cursor (LOCATE), and set display attributes (COLOR), I'd be deceiving you if I led you to believe that the key difference between using a tinker's programming language (BASIC and to some extent Turbo Pascal) and a professional's programming language was the presence of convenient, machine-specific features like screen-clearing. Far from it.

**INDUSTRIAL STRENGTH** As much as everyone thinks he'd be better off brushing with "industrial strength" toothpaste, the reality is that industrial strength also means "not safe for pets and small children."

And C is, so to speak, an industrial-strength programming language. You have to wear heavy gloves, a hard hat, and



## ■ PETER NORTON

maybe a lead-lined apron when you're working with C, because it's not a language that's designed for safe use.

A concrete example will show you what I'm talking about. In most program-

ming languages, testing if A equals B is done something like this: IF (A = B). But in C, a double-equal (==) is used to compare numbers, so in C you should write that statement IF (A == B). If you make a

mistake and write = instead of ==, C won't flag it as an error (as, say, Pascal would). Instead, C will merrily copy the value of B into A and then perform the IF-test on the value. That's a disaster.

On occasion, even experienced C programmers make this mistake and dozens like it that are lurking in the unsafe waters of C. Scholars of programming languages can, and do, point out that problems of this kind are flat-out design defects of C, and that well-designed languages, such as Pascal, have many error-catching safety nets built into them.

While it may be fair and accurate to throw bricks at C and bouquets at the likes of Pascal and Modula II in the name of programming language design features, to do so would be to miss a very important point: professional tools work to a different standard and serve different needs than ama-

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■ Don Granger switched to the best professional tool for serious program development. And then he discovered an ugly truth: professional tools are different.

teur tools. If C is a "dirty" language that allows programmers to do lots of tricky and powerful things, that's why it's become the language of choice for deep professional programming.

What Donald discovered, with the specific situation of missing library features that he was used to, was really just a small part of a larger issue—that power tools, professional tools, put-it-all-into-your-hands tools are much more demanding to use than are other tools. And that's something that you need to be aware of.

**SWITCHING SOFTWARE** I don't mean to pick on Donald (we had a very rewarding exchange about these things), but



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VIEWPOINTS

### ■ PETER NORTON

there was another interesting aspect to his question about using C. He also asked about my *Norton Editor* program, and what he asked went something like this: "Does it have my favorite feature from *MS Word*? Does it have my favorite feature from *IBM's Personal Editor*? Does it have all my favorite features? . . ." My answer was no, it doesn't have any of those; but it does have what will become your favorite features in the *Norton Editor*.

What was going on with his questions, both about programming in C and about using—egad—yet another programmer's editor, was what we all face whenever we consider moving to a new software tool. We want new things, but we're not really willing to give up old things. We want our next spreadsheet to be as quick as Lotus's 1-2-3, as slick as Ashton-Tate's *Frame-work*, as rich as *Microsoft Word*, and so

■ Programmer's routine libraries let you use the wheel—a whole garage full of wheels—instead of reinventing the wheel.

on. Good luck to us: we'll never find it.

When we move from one piece of software to another we're not going to find all our old cozy favorite features. That's true in any software realm, and it's particularly true when we move from convenience programming to professional programming. It's like graduating from high school to college. Mom and Dad won't be washing our socks anymore—but we'll be living in a much bigger world.

To close, I've made a discovery for fans of beer and PC trivia. There's a particularly bilious Belgian brew named BIOS Beer. BIOS goes well with late-night PC computing. As the bottle proudly proclaims, "BIOS has a natural sediment." In the dark hours it seems to collect at the bottom of my hard disk.

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■ JIM SEYMOUR

# MANUSCRIPT: SOMETHING OLD, SOMETHING NEW



*Besides just being a fine program, Lotus's new scientific word processor also has the salutary effect of making us reconsider long-abandoned paradigms.*

**W**ant to see the future and the past in PC word-processing software . . . all in one product? Take a look at Lotus's new *Manuscript*.

It's the most interesting and important program from Lotus in a long time. And given its design, it may be a program that only Lotus could release with a straight face.

Don't take that as criticism. I think *Manuscript* is one of the best programs I've seen in the past year, with a coherency and degree of power matched in word processing software only by *Microsoft Word*, Version 3.1, *WordPerfect*, Version 4.2, and the new *Word 3.0* on the Mac. *Manuscript* isn't for everyone, but for those for whom it's intended, it's a brilliant match between users' needs and a program's style, approach, and features.

Back to the future-and-present idea. In the beginning, there were text editors and there were text formatters. You dredged up this sludgy thing called a text editor on the mini or mainframe (and, eventually, on the early PCs) and used it to pound your words into something approaching finished text. The process was a bit like Arthur C. Clarke's ape-men at the beginning of 2001, sitting around the fire and banging bones together.

WYSIWYG? You're kidding: what you saw was a screen full of solid lines of letters and numbers.

You saved this lumpy mass as a file, then ran it through a text formatter, which still didn't show you on the terminal's screen what the document would look like but did ship the text out to the printer with

enough formatting instructions to produce finished pages that occasionally bore some resemblance to what you were hoping for.

That's how *Manuscript* works—redividing the word processing job into text editing and text formatting—except that it does so with astonishing speed and surpassing elegance. That's why I said *Manuscript* shows you the past in PC word processing, and also why I said it's a program only Lotus would have the chutzpah to bring to market. Who else could seriously offer such a retrograde, anti-WYSIWYG approach?

**WYSIWYG'S FUTURE** But I also said *Manuscript* shows you the future of word processing.

Because, as you're writing, you can always jump into an extraordinary page-preview feature. *Manuscript* then divides your screen into left-two-thirds and right-one-third windows. It draws a correctly

proportioned vertical box on the left side, representing a finished page, then drops into that rectangle a perfect "picture" of how that page will look when printed.

Because of screen-size limitations, standard body-type in that image of the finished page is something like what art directors call *dummy type*: little squiggles representing letters, numbers, words, and sentences. You can't read it. But there's a small horizontal rectangle floating around on that page—a *magnifying glass*—that shows, in a window in the upper part of the right-hand side of your screen, exactly how the patch of text under the magnifying glass will look when printed.

Well, not *exactly*: it doesn't show different fonts. But it does get relative sizes and weights right, shows italics, and so on. Most important, *Manuscript* shows how the page fits together—whether the margins are too large or small, whether the text would look better higher or lower, whether running-head page numbers are going to appear where you thought they would, and so forth.

A lot of us have been predicting a convergence between standard word-processing software and what we've been calling "desktop publishing" programs—more accurately described as page-makeup software. *Manuscript* is the first full-fledged word processing program to come to market with such a rich set of page-assembly and page-display tools.

*Manuscript* unquestionably shows where word processing software is headed. That's not nearly the end of it, though. *Manuscript* will also let you size 1-2-3 and



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## ■ JIM SEYMOUR

*Symphony* graphs, *Freelance* charts and artwork, even scanned-in photos and art from other sources, and paste them into documents. It can neatly wrap text around those graphics if you wish.

The graphics elements appear as empty boxes when you're in the text-entry mode, but when you go to page-preview, *Manuscript* draws a crude but effective (and accurately scaled) representation of those graphics elements on the mocked-up page.

Maybe most important for *Manuscript*'s primary users, the scientific/technical audience, the program lets you insert even very complicated mathematical formulas into your text with ease, then shows you just how those formulas will appear on the finished page with its page-preview and magnifying-glass features.

The program also makes creating columnar tables easy and lets you draw single- or double-line boxes around and through them for grouping and better legibility.

**EVOLUTIONARY STEP** All in all, quite a piece of work. It's good to see the fine hand of Jon Sachs—principal author of 1-2-3—in a piece of software again.

But though some are suggesting that *Manuscript* may break out of Lotus's technical and scientific target markets, I think it's a poor choice for general WP use. It's not quite a bear to learn *Manuscript*, but it's not a trivial exercise either. And while

heretical batch approach to the latter job—and the way it illuminates the path toward page composition design that every other important PC word processing package is going to have no choice but to follow

over the next year and a half.

*Manuscript* isn't just good—it's a genuinely important step in the evolution of PC software. And a tantalizing preview of coming attractions.



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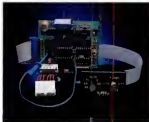
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■ *Manuscript* unquestionably shows where word processing software is headed.

many secretaries would love that page-preview feature, a lot of its other features are irrelevant in routine correspondence and short reports.

The most interesting aspects of *Manuscript* are the object lessons it provides about the worth of reconsidering long-abandoned paradigms—separating writing and formatting, and adopting an almost-



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Keyboard Compat. IBM PC/XT	Yes	No*
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■ STEPHEN MANES

# THE DEMONSTRATION

*When time is of the essence in getting PCs to perform work, even the best-laid plans can go awry—more than you can possibly imagine.*



You are about to give a word processing demonstration to an audience of 10-, 11-, and 12-year-olds in a school auditorium a thousand miles from your home. You have done this often enough to have prepared for the worst. You have brought duplicates of all your software on single-sided disks in case somebody shows up with an old clunker. You have brought a boxful of installation programs and DOS versions. You have made sure you will be able to set things up one full hour before the scheduled presentation so you can take care of any possible problems before the kids file in.

But today looks like clear sailing. Two bright-looking fellows are setting up the projection monitor. The computer is a plain-vanilla IBM PC-XT. Everything is cabled and ready. The monitor's test pattern looks fine. The audiovisual experts are standing by. You flip the Big Red Switch.

**OUT TO LUNCH** Nothing appears on the screen. The XT's disk drive flashes its red LCD, apparently booting successfully. The monitor is out to lunch.

Maybe it's a cable. It usually is. You look at the one stretched between the monitor and the machine. The audiovisual fellows insist it's the right one for the monitor. They've used it before. It's even got a tag on it that says "PC to monitor."

Then you notice a weird Y-connector coming out of the back of the XT. One end has a male 9-pin D-connector; the other is hooked up to the monitor cable.

"What's that?" you inquire.

"I think that's for the bar code reader," says your hostess.

You take another look. There is no bar code reader. And even if there were one, you have the sneaking suspicion that it would be unlikely to employ the same port as RGB video. "Are you sure?"

"Not really," says your hostess.

You scrutinize the back of the machine more closely. You notice a 25-pin D-connector below a 9-pin jack. That's the suspicious signature of a monochrome display card—unless, of course, it's one of those newfangled multifunction cards with a printer port and an AT-style serial port. Or something else.

**SWISS KNIFE** You glance at your watch. Half an hour till the kids arrive. "Anybody got a screwdriver?" you ask.

A chorus of "Not me" is followed by a lone "I'll see if I can find the janitor." You whip out your Swiss Army knife. Lucky

you! The A-V folks are power users. The cover is secured to the back panel by one lone screw.

You slide the cover off. The card connected to the monitor is a half-length model. The card with the two connectors does indeed appear to be some sort of monochrome display driver. You can't be sure, though. Neither card has any sort of legend describing what functions it is designed to perform.

Perhaps the XT's internal switches are set for monochrome. You recall how the air cleaner on your car has a sticker informing mechanics of its tune-up specs. You wish IBM had provided a similar sticker for switch settings. You ask your hostess if she happens to have a Guide to Operations.

"A what?" she asks.

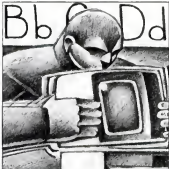
"The manual," you reply.

She rolls her eyes and shakes her head. You manage to remember that switches 5 and 6 of SW1 control the monitor settings. What you can't remember is how they're supposed to be set. But what the hell—there are only four possibilities; the worst that could happen is that you blow out a \$3,000 projection system. You quickly try all the combinations in succession. As you expect, three produce nothing but beep the moment you hit the switch. The fourth produces nothing at all.

A class fills in early. The teacher thought the session was supposed to start at 10 instead of 10:30. A kid asks, "Are you going to use that computer?"

"If we can get it to work," you reply.

"Is it plugged into the wall socket?"



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## ■ STEPHEN MANES

asks the teacher. The kids giggle.

You do not dignify this question with a reply. Instead you ask your hostess whether the school might have a machine with a color display card. Neither she nor anyone

else has any idea. However, the school receptionist seems to remember that the principal just got some kind of new computer that may be behind a locked door to which the key seems to be missing.

**BEHIND DOOR NO. 1** As bells toll the change of class, a key is duly produced. You are admitted to a cubicle that contains a shiny new PC AT. And, it is even attached to a shiny new IBM Color Display! The gods are kind today!

Unsheathing your Swiss Army knife, you discover that the AT is crammed into a semi-custom cabinet, and every cable is stretched taut. You quickly unclamp the cable from the printer and yank the system unit from the cabinet. You then perform official Swiss Army maneuvers to liberate the monitor cable.

As another bell rings, you realize that the auditorium must now be full of fidgety striplings anxiously awaiting your arrival. You decide that trying to undo the five screws on the back of the AT, moving the display card to the other machine, and trying to figure out the proper settings of switches 5 and 6 of SW1 is probably a lot less sensible than taking the whole AT into the auditorium and plugging it directly into the monitor. You slam the AT onto a handy cart and roll it down the hall, printer cable dragging like a caudal appendage. The pedant responsible for the AT's security gives you a stern look and intones threateningly, "I just hope you can put it all back together again."

In the auditorium, frazzled teachers are threatening to wreak discipline on their restive young wards. No time for screwdrivers. You plug the D-connector from the monitor into the back of the AT and hit the switch. The power-on self-test appears on the screen.

You slam your software into drive A: and fire up *WordStar*. There's no time to load your keyboard enhancer, so you rely on your knowledge of *WordStar's* Ctrl-commands. You press Ctrl-K. A capital K appears on the screen. You press Ctrl-B. A lowercase b materializes.

Oh. The AT is equipped with the new IBM Keyboard. The one with the Caps-Lock where Ctrl should be. The gods are chortling.

After a demonstration full of "Hmms" and "Oopeses" and "Sorrysts" from you and snickers of "Is this jerk for real?" from the kids, one youth asks just how much time the computer really saves you. You reply that you couldn't begin to guess.

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Find file on disk - worst time	<b>5.2</b>	192.0 (C)	N/A	N/A (D)	30.1	33.5	106.1
Display directory map of drive C - Normal time	<b>0.8</b>	N/A	28.0	N/A	N/A	0.8	24.7
- Worst time	<b>5.5</b>	N/A	28.0	N/A	N/A	31.9	24.7
Return to directory list after running another program	<b>0.1</b>	N/A	29.9	4.2	3.0	3.0	26.8
See files on drive A, then return to map of drive C - worst time	<b>7.2</b>	N/A	31.1	N/A	N/A	34.7	27.8
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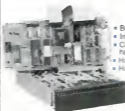
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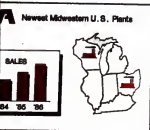
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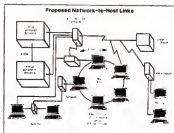


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1		
2		
3		
4		
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SUN	MON	TUE	WED	THU	FRI	SAT	SUN	
		1	2	3	4	5	6	
8	9	10	11	12	13	14	15	
16	17	18	19	20	21	22	23	
24	25	26	27	28	29	30		



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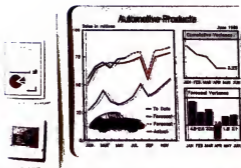
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Figure 4

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■ STEWART ALSOP

# BACK TO THE STONE AGE



*Nineteen eighty-six was the year the capabilities of PCs exploded at such an alarming rate that, ironically, they became almost impossible for most people to use.*

If we were honest with one another, we would have to call 1986 the year of the technical fad. During this year, programmers and product designers went nuts coming up with new ways to confuse buyers and users of computer products, and *PC Magazine's* editors went nuts sorting it all out for you. I predict that this proliferation of features will result in the worst implosion the personal computer industry has ever seen, as buyers get fed up with the industry's infatuation with technical developments. Take just the following four different areas as examples.

**SPEED KILLS** From IBM alone, you now have a choice of computers that operate at clock speeds of 4.77 MHz, 6 MHz, and 8 MHz with or without wait states. From other companies, you also have a choice of an 8086 chip running at 8 MHz, a NEC V20 chip (compatible with the 8088) running at 7.77 MHz, a speeded-up 8088 chip that operates at 9.54 MHz, an 80286 chip operating at 8, 10, 12, or 16 MHz, and an 80386 chip running at 16 MHz, with or without wait states.

What does it really mean to have a computer that runs at 9.54 instead of 7.77 MHz? You keep hearing that some computers have a tough time running some timing-dependent software, particularly network-based applications. And, since memory access has such a strong effect on actual system performance, you have to make sure you have memory fast enough to keep up with the processor (memory speed, of course, is expressed in nanoseconds, not megahertz). But the central

question is, should the buyer of personal computers be forced to learn about such arcane subjects as wait states, interrupts, megahertz, and nanoseconds?

**RESIDENTIAL MEMORY** *SideKick*, *Turbo Lightning*, *SmartNotes*, *TimeSlips*, *Hotshot*, *SideTalk*, *Keywords*. These are some of my favorite products. Each of them has a compelling benefit that I would like to have on my computer system. But I don't use any of them anymore. All of these products are memory resident, which means that they will pop up on top of whatever applications program I'm using.

I don't use memory-resident programs anymore because they have an annoying habit of working only in certain situations, such as only with character-based applications or only by themselves or only if they were the first or last program to be installed. And there are so many of them that I can no longer figure out which works

with the other. One company, Persoft, came up with a program called *Referee* to adjudicate conflicts between resident programs. But I've discovered I don't want to spend my time setting up *Referee* to make sure that the other programs work together with my major applications. (See Charles Petzold's excellent review of memory-resident products in "How RAM-Resident Programs Work (And Don't Work)," *PC Magazine*, Volume 5, Number 20, for a perfect expression of this problem.) So I've stopped trying to use these products. From what I hear, I'm not the only one who's given up. And that's a crying shame because these programs deliver real value to the user.

**GRAPHICAL CONFUSION** Thank the Lord for NEC Home Electronics and Video 7 and/or Paradise Systems. If these companies hadn't developed their monitor (the wonderful NEC MultiSync) and video board products (the Video 7 VEGA Deluxe or Paradise AutoSwitch EGA), I wouldn't have been able to figure out how to get all my software to work on the same computer system. Within a year after the PC first came out, all programs supported one of three display controllers: monochrome, monochrome graphics, or color graphics. None of these was great by itself, but it was easy to tell the difference between them and to match a monitor with a controller with software. Then IBM introduced the Enhanced Graphics Adapter in 1984, which was only marginally compatible with the Color/Graphics Adapter. EGA boards didn't sell well until Video 7



Illustration: Doug Fraser

## ■ STEWART ALSOP

figured out how to make a board that could run any software.

But you haven't seen anything yet. Last year, Intel and Texas Instruments both introduced wonderful chips that can display

text and graphics at very high resolution. But neither is compatible with preceding graphics modes. And, of course, IBM still has something called the Professional Graphics Controller hanging around. This

stuff is all really swift, but you don't know the definition of confusion until you try to put together a system that actually works (an amazing concept in itself).

**FANTASTIC OUTPUT** Laser printers became a truly hot product in 1986. Typically, the capabilities of these products exploded geometrically. Even leading technical people in the industry had difficulty figuring out which software would support which laser printers, not to mention learning what amounts to a new programming language (PCL, which stands for Printer Control Language) foisted on us by Hewlett-Packard with its Laserjet printer. Now the overwhelming concern of laser printer users is how to tell just what's going to come out of the printer when you invoke the print command. The results are rarely what you expected.

■ **Referee** adjudicates conflicts between resident programs. But I've discovered I don't want to spend my time setting up *Referee*.

In this context, the dictionary defines the word *standard* as "an acknowledged measure of comparison for quantitative or qualitative value; criterion; norm." To be honest, I don't see any standardization here. What I see happening is the fragmentation of what was once a standard. If you take that idea to its logical conclusion, what we might end up with are multiple, popular configurations of computers, each representing an approach to (or so-called standard for) computers. Some software and some boards won't run with any computer. We are losing the very benefit of standardization that we all thought had already evolved. If this continues, we'll be thrown back in time to a world in which you have to be technically competent to get your computer to work.

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PC Magazine—Oct. 28, 1986

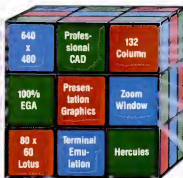
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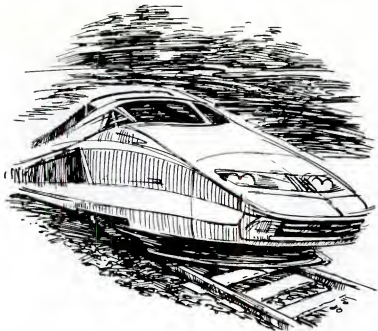
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*Desktop publishing is a hot concept but not a new one. Ever since Gutenberg, publishers have been looking for a better, cheaper, faster way to get words and pictures on paper. Now many vendors are claiming that their products are the answer. What's the truth? What do you need? How much will it cost? First in a series, this article looks at the burgeoning desktop publishing market.*

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# DESKTOP PUBLISHING WITHOUT HYPE

**T**he cry has been heard throughout the land: "Publish or perish!" All of a sudden, virtually every personal computer product claims to be capable of desktop publishing, even though many of these systems were designed well before the term had been invented. Laser printer vendors are now claiming that they've got just the right combination of fonts, emulations, duty cycles, and page description languages. Whether they sell optical character readers (OCRs), graphics scanners, tablets, light pens, or mice, peripheral makers are claiming that

## ■ DESKTOP PUBLISHING

their products are the greatest way to get words and pictures into a computer.

Word processing vendors are claiming that their products are actually low-end desktop publishing programs.

Many of these claims are the worst kind of bunk.

The truth is a little more sobering.

**AND APPLE CREATED THE MAC** Let's be honest: the Apple Macintosh combined with an Apple LaserWriter printer and Aldus Corp.'s *PageMaker* software created the desktop publishing market (for more information about the new version of *PageMaker* for the PC, see the review in this issue). Indeed, Aldus's Paul Brainerd is credited with creating the expression *desktop publishing*.

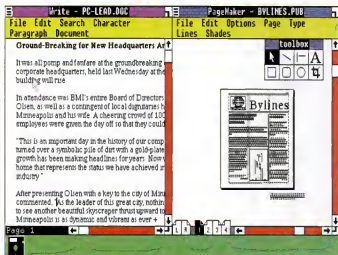
Before July 1985, when these products were available together in retail stores, the only serious attempts to use personal computers for publishing were being made by people in the magazine business who knew a lot about typesetting. These PC publishers were inserting typesetting codes (like <BO, TR, 10, 11>, for 10-point-on-11-point Times Roman boldface) into word processing documents created with products like *WordStar* and *XyWrite* (the two most-favored programs for this work) and then telecommunicating those files to typesetting service bureaus.

Before the dawn of desktop publishing, computerized publishing systems were considered a turnkey business. The minimum entry ticket was about \$30,000 (the current price of the Interleaf system, which includes a very expensive laser printer).

Thanks to Apple and Aldus, there's a way to shortcut that belabored and/or expensive process by creating documents on the screens of our own computers and printing them out in our own offices. Importing documents becomes a simple matter of pulling a menu down and invoking the Place command. Designing a page is a simple matter of clicking the mouse on tools and positions. Printing, even at resolutions of over 1,000 dots per inch, is a simple matter of pulling a menu down and invoking the Print command.

With the integrated capabilities of the Macintosh/LaserWriter/*PageMaker* system, people with a minimum of training and experience have been able to produce

## WINDOWS: A MAC-LIKE INTERFACE FOR PC DESKTOP PUBLISHING



Microsoft Windows is an integrating force for desktop publishing; in addition to supporting common file formats, such as Dynamic Data Exchange (DDE) and TIFF formats, you can run different applications in different windows on-screen.

**M**ost page composition packages rely heavily on the ability to incorporate files created by other software packages—such as word processing and graphics programs—into consolidated files that can be printed on a high-resolution printer. While it has been argued that Macintosh users have suffered from the trade-offs required by the Mac's closed architecture, there are distinct advantages to the Mac's common user interface between applications and file formats that are easily exchanged between different software packages through the clipboard. These features are of special importance for desktop publishing.

The lack of integration between PC packages means that each page composition product manufacturer must decide independently which text and graphics files to support, which graphics card to support, and which printers to support.

As a consequence, economy-minded potential desktop publishers must base their purchase decisions on how each package fits in with their current equipment/software configuration, rather than on the page composition product's features.

*Microsoft Windows* (\$99 from Microsoft Corp.; (800) 426-9400) provides a graphical operating system "shell" that gives MS-DOS a Mac-like front end with menus, windows, icons, and a built-in clipboard. From the user's perspective, different types of software can be learned more easily with a common interface among applications, rather than with the current mix of implementations of PC packages.

Last fall, Microsoft Corp. held a special seminar for software developers, presenting *Windows* as the vehicle for desktop publishing applications. Support for this environment is growing steadily,

partly because Microsoft is marketing *Windows* heavily to manufacturers of publishing products, and partly because *Windows* facilitates file compatibility between page composition software and other software, especially graphics. For example, Microsoft has released the Tagged Image File Format specification, which is intended to provide a common format for interchanging digital information, such as that produced by scanners and read by page composition software, within the *Windows* environment. *Windows* provides the developers of software applications with device drivers, for both monitors and printers, which saves the developer the time and cost of writing their own drivers.

It is significant that the most popular page composition package for the Macintosh, *PageMaker*, was coded under *Windows*. Developers claim that up to 80 percent of the code in the Macintosh environment can be used on the PC if the application runs under *Windows*. We can expect to see other Macintosh packages, like Manhattan Graphics Corp.'s *ReadySetGo* page composition software, and many graphics libraries, like that of Software Publishing Corp.'s *PFS: ClickArt*, available on the PC under *Windows*. Drawing programs are becoming available, such as Micrografix's *Windows Draw* and Cricket Graph's business-graphing package.

The advantages offered by most desktop publishing products in general, and *Windows* in particular, require a significant investment if you are starting with a plain vanilla PC. An accelerator board on a standard PC or an AT is required to obtain suitable speed from *Windows*. The extra power that you must supply is well worth it, especially for desktop publishing applications.

The extent to which this will be true in the future depends largely on whether or not *Microsoft Windows* turns out to be a standard environment for the PC, and the answer to that question is anybody's guess. Perhaps the demand for compatibility in desktop publishing applications will help provide the answer.

—Diane Burns and S. Venit

good-looking, well-designed publications. And at the same time, desktop publishing seems to have single-handedly saved the \$2 billion Apple Computer Corp. from the dustheap of personal computer companies.

**NOW, FOR THE PC** While the ability to produce publication-quality documents has been restricted for the past year and a half to Macintosh users, it is now becoming available in a widespread fashion to PC (and compatible) users.

In our usual no-nonsense style we evaluate in this issue of *PC Magazine* five page composition programs that have become available for use on an IBM-compatible computer, including the eagerly awaited *PageMaker* for the PC, which we looked at in a beta-test version. In future issues, we will evaluate the products that make up the other components of a basic publishing system, including scanners, laser printers, publishing utilities, full-page displays, and so forth.

But first, how much truth lies behind the new claims for desktop publishing on the PC?

**BACK TO REALITY** A certain craziness has attached itself to the field of desktop publishing. As is usual in the personal computer business, all sorts of "sky's-the-limit" forecasts and mind-blowing capabilities are being assigned to the future of desktop publishing. So, what's the real story? The following three important points give some perspective to the current market frenzy.

First, the designers of the original IBM Personal Computer were concerned with far more elemental issues than displaying fonts or presenting formatted displays. Since the basic design of the PC hasn't changed much in the past 5 years, it must be equipped with a variety of peripherals to accomplish what most people have come to perceive as desktop publishing.

Second, the developers of desktop publishing software decide which peripherals and software to support. You may have chosen differently, making configuring an IBM-compatible desktop publishing system difficult and expensive.

Third, the basic technologies that support desktop publishing software are moving at the usual blinding pace, making it

difficult to keep up with new developments.

So the only way to evaluate what is going on is to understand the basic components of a desktop publishing system and how they interact with each other.

## PAGE COMPOSITION SOFTWARE

The centerpiece of desktop publishing is page composition software. The software is so important that we've dedicated one article in this issue to looking at the various packages on the market for the PC (see "Muscling In on the Mac: PC-Based Page Composition" in this issue).

The page composition program you use is what pulls together text and graphics and gives you the on-screen tools to format and then lay out the content, with columns, headings, and so forth. Unlike most productivity applications software, page composition programs cannot function effectively without the help of other programs like word processors, painting and drawing programs, and font editors.

For this reason, the page composition software you choose will determine how you resolve compatibility issues. It will dictate which word processors, graphics programs, utilities, and peripherals you can use. Ideally, to minimize training time, the page composition program should have an interface similar to your other applications, since you will be switching back and forth frequently.

**COMPUTER** At a minimum, the basic system must be powerful. Desktop publishing involves the ability not only to put a graphic image on the screen, but also to manage multiple tasks like kerning letters, keeping track of word position on multiple pages, and rehyphenating on the fly.

To manage these tasks, the software requires at least an 8-MHz processor and 1 megabyte of memory. (You can use a less powerful system, but you'll then spend most of your time at the coffee machine.) Fortunately, with some 80286-based computers selling for under \$2,000, such systems are just now becoming widely available at a reasonable cost.

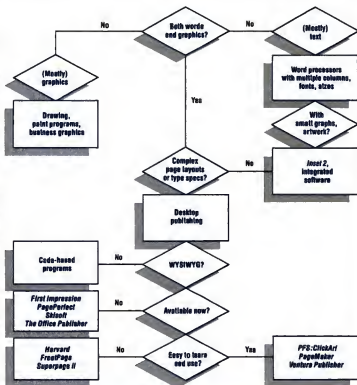
In the future, several developments, including 32-bit microprocessors, capable new operating systems, and specialized coprocessors, promise to elevate the basic



## Desktop Publishing Decision Guide

This chart should help you zero in on the most suitable of the six currently available WYSIWYG (what-you-see-is-what-you-get) desktop publishing (page composition) packages. The six are arranged across the bottom from left to right in approximate order of increasing price (\$185 to \$7,000), complexity, and capability. At least four more will be available in coming months, in addition to current end future non-WYSIWYG code-based packages more suitable for longish documents where the layout can be described through a series of repeating format or style codes.

Key differences among page composition programs include the learning curve, ease of use, variety of graphics images that can be included (vector, or object-oriented, graphics are more limited than bit-mapped graphics in desktop publishing applications), the ease of editing text (Ventura Publisher even ripples changes back to the original document), the ability to replicate page design elements in multiple documents, the length of documents that can be comfortably accommodated, and the types of printers each program supports. All programs work best with a mouse or other input device, an AT compatible (8088-based systems are too pokey), and an EGA-, Hercules-, or better-resolution monitor.



### Program Strengths

- Allows heavy editing throughout production
- Carries same design across documents
- Handles long documents
- Does limited bit-mapped graphics
- Does flexible bit-mapped graphics
- Does vector graphics

**PFS:ClickArt**  
Personal  
Publisher

**FrontPage**

**Harvard**  
Professional  
Publisher

**PageMaker**

**Ventura**  
Publisher

**Superpage II**

●		●		●	●
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computer system to the point at which compatibility and ease of use will become more important than basic power.

**SYSTEM SOFTWARE** The basic system software—the operating system and its environment—should enforce some standards on data types and formats and on the user interface while providing the ability to display graphics and text fonts in a consistent and flexible fashion.

In a Macintosh system, you can depend on the system's ability to transfer ASCII text and *MacPaint* files from one application to another, regardless of what other formats a program supports. In addition, the *Macintosh Finder* creates a minimum standard for the user interface so that you don't have to learn new ways of executing the same basic filing and editing commands for each application. Possibly most important, the Macintosh contains a standard set of screen and printer fonts, so that your output looks identical to what you see on the screen, regardless of which program or printer you use.

The system software is where the IBM-compatible system is weakest, since DOS offers no basic resources for handling fonts or graphics, for exchanging data, or for developing a common user interface. On IBM compatibles, *Microsoft Windows* seems to be the only contender for providing a standardized environment for desktop publishing. (See sidebar "Windows: A Mac-like Interface for PC Desktop Publishing" in this issue.)

Yet only one of the products we review here is written for *Windows*. Of the others, one is written for Digital Research's *GEM* environment, and the rest use proprietary environments. All support a somewhat different set of word processing and graphics applications. And IBM hasn't made any visible moves to support a standard environment for graphics applications.

**DISPLAY** In desktop publishing, you've got to have some way of seeing how your document will look when it is printed. Some vendors will try to persuade you that coding a document is a much more precise way of formatting. If that were so, desktop typesetting would have become a popular application years ago, and we would all qualify as typesetters.

## ■ All sorts of mind-blowing capabilities are being assigned to desktop publishing.

In the real world of the IBM PC, the minimum-quality output that a desktop publishing program requires is achieved by either the IBM Enhanced Graphics Adapter or a Hercules monochrome/graphics card with the appropriate monitor. The resolution on the basic IBM Color/Graphics Adapter isn't capable of accurately showing you what a 300-dpi printer can produce; the result is constant experimentation trying to get your document to look right. Whether the display is capable of color or not is irrelevant, since you can't faithfully print any of the colors on your screen except black and white.

**INPUT** Right now the most basic input devices are the keyboard and the disk drive. According to publishers of desktop publishing software, most documents produced on a computer still contain only text. But with desktop publishing software, that text is more likely to be separated by lines and boxes and to be formatted with different type styles and sizes.

Most people aren't willing to give up the hours they spent learning the nuances of their favorite word processors so that they can write directly in a page composition program. It's therefore very important for the page composition program to be able to import fully formatted documents from a variety of popular word processors.

In addition, since most people aren't artists, most of the graphic images used in desktop publishing are so-called clip art—images produced specifically for use in page composition programs—or business graphics that other programs such as *Lotus's 1-2-3* or *Decision Resources' ChartMaster* generate automatically.

Some desktop publishers are also using OCRs and graphics scanners to bring pre-printed material into their documents. But

scanners are still relatively expensive at \$1,500 and up, and almost no standards have developed for file formats for scanned graphics.

**OUTPUT** The point of putting this equipment together on an individual's desktop, of course, is to end up with a formatted, attractive document that can be copied or printed for a group of people. Once a document is prepared on the computer, the system should be capable of printing it out in a variety of media and resolutions without reconfiguration.

One of the reasons that the Macintosh system became popular is that it is standardized on PostScript, a page description language (PDL) from Adobe. A PDL is a system for describing whole pages to a printer (for more information on PostScript and the two other leading PDLs, Xerox's Interpress and Imagen's DDL, see "Putting Text and Graphics in Their Place" in this issue).

**THE PRICE IS RIGHT** If you don't compromise, the whole system will cost more than \$10,000, even if purchased from discounters. Even so, that price tag is less than a third of what a system with the same capabilities would have cost you just 2 years ago.

The plummeting price of desktop publishing is creating a lot of excitement in the personal computer industry. Just as spreadsheets revolutionized the world of financial analysis by leveling the playing field for small and large companies alike, desktop publishing applications are revolutionizing the world of written expression. Indeed, with the basic elements of hardware and software mentioned above (plus a high-speed copying machine, which still costs upwards of \$20,000), you can have a completely self-contained publishing, production, and printing system.

As the authors of one desktop publishing treatise are fond of saying, "Happiness is owning the printing press." But there's still a long way to go before a humble PC user has the tools to challenge sophisticated computer typesetters and page makeup artists. The articles and reviews that follow and the future issues we've planned show how far desktop publishing on the PC has come and where it's going. ☐

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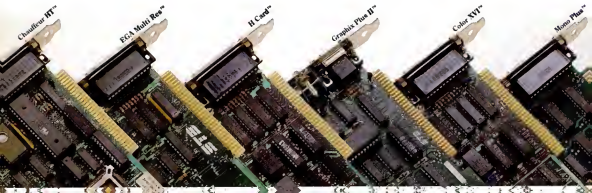
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*Even the staunchest IBM chauvinists conceded Apple's leadership in the desktop publishing field. Now, five new, under-\$1,000 WYSIWYG page composition programs—PFS:ClickArt Personal Publisher, FrontPage, Harvard Professional Publisher, PageMaker, and Ventura Publisher—make the PC a worthy challenger to the Mac.*

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# MUSCLING IN ON THE MAC

## PC-BASED PAGE COMPOSITION

Over the last few months, an avalanche of page composition programs priced under \$1,000 has been announced for the PC. These new products are turning the heads of publishers at every level, drawing large crowds at conventions and filling seminars devoted to a controversial topic: desktop publishing, once the exclusive territory of the Apple Macintosh. Just over a year ago, when we first reviewed publishing systems on the PC (see "Words into Type: Meeting the Corporate Challenge" and "PCs and Typesetters: A Mixed Marriage" in *PC Magazine*, Volume 4 Number 25), a diverse assortment of products were being touted: typesetting front ends that let you embed typesetting codes in text and WYSIWYG (what-you-see-is-what-you-get) word pro-

## THE MAC AND THE PC COMMUNICATE

*Now you can have the best of both worlds by linking a PC and a Mac and transferring files between them.*

Desktop publishing for the PC has arrived—witness the products reviewed in this issue. But perhaps you have already invested in a Macintosh along with your PC, or perhaps you'd rather buy a Macintosh than invest in the extra memory, hard disk, and graphics card required for your PC to run many of the programs reviewed here.

No matter whether you choose to do final page composition on the PC or on the Mac, you're not limited to using just one or the other: you can link the two machines and transfer files between them.

**TELECOMMUNICATIONS** One solution to transferring files between any two computers is telecommunications: you can send ASCII files, without formatting codes, from a Macintosh to a PC either through a telephone line (by modem) or through a direct-connect cable and use communications software specific to each computer to direct the transfer. You can also send ASCII files from one computer to a central mailbox or service (such as MCI Mail, CompuServe, or The Source) and download them later to any other computer equipped with a modem.

This procedure works well with simple ASCII files, used to transfer letters of the alphabet and numbers. Many word processing programs include some op-

tion for saving files in ASCII format, but this process strips out the formatting codes. You can preserve some of the formatting (such as bold and italic variations) by using special "conversion" programs. Of the page composition systems reviewed here, only *PageMaker* creates files that are directly transferable between the Macintosh and the PC.

**LINKING SOFTWARE** Besides the generally applicable telecommunications programs, some packages are designed specifically to link the IBM and the Macintosh. Products like DataViz's *MacLink* Plus fall into this category.

*MacLink* comes with software for both the Macintosh and the PC; you can use phone lines with modems or the cable connection that comes with the package and plugs into the PC's serial port and the Macintosh's modem port. The software, controlled entirely from the Macintosh, provides a menu of file formats by originating program name (*WordStar*, *Microsoft Word*, *DisplayWrite*, 1-2-3, and so forth) as well as by file format (DIF, WKS, SYLK, ASCII, binary, and so forth). This system makes it easy for you to identify the type of file you are converting without knowing the technical details, such as how 1-2-3 files are actually stored.

*MacLink* also lets you read the directo-

ry of the IBM PC from the Macintosh and select the files to be transferred, either from the PC to the Macintosh or vice versa. *MacLink* incorporates sophisticated conversion routines that preserve certain format settings, such as boldface and italic selections in word processing files. *MacLink* can also be used as a desk accessory on the Macintosh, allowing for translation of files on networks.

**HARDWARE SOLUTIONS** Some developers have hardware/software combination solutions to the conversion problem. Tangent Technologies' PC MacBridge, for example, is a combination of software and an expansion board that you insert into a slot in the IBM to enable direct connection with an AppleTalk network. This is most directly useful in allowing you to print *WordStar*, *MultiMate*, 1-2-3, and ASCII text files directly from the PC to Apple's LaserWriter. None of the new page composition products are supported as yet.

PC MacBridge includes a mailbox utility for the PC, which Macintoshes on the same AppleTalk network can access if they are equipped with Videx's *Mail Center* electronic mail package. In addition to sending messages, this combination gives you the ability to transfer your text files from the PC to the Macintosh and vice versa.

cessors that let you see bold and italicized words on the screen. Yet only two of the software programs we reviewed then let you incorporate text and graphics on full-page screen displays that actually looked like the printed page.

Today's new page composition programs are more advanced. Many implement the drop-down menus, windows, and WYSIWYG displays that originated at Xerox PARC (Palo Alto Research Center) and were made famous by Apple's Macin-

tosh. Also, the crowds who are now considering desktop publishing applications are different from those who might have been attracted to the packages we reviewed a year ago. Then most of the products we looked at would have been exhibited at typesetting conventions rather than at computer conventions; the PC-compatible typesetting programs were considered to be low-cost alternatives to traditional mainframe front ends, and the target market seemed to be those who already owned

or used a computer typesetter.

This year, these packages are attracting interest from corporate publishing departments and small companies that have never used a typesetter before, as well as those who have paid dearly for outside typesetting services. They are also generating interest from an entirely new segment: instant printers and copy shops, designers, and free-lance writers are starting to use this new technology to offer typesetting to their clients.

**NETWORKS** The ultimate solution to the file transfer process and its problems may well come from network and hard disk manufacturers, but products in this last category are still not perfect. The fact that you can tie IBMs and Macintoshes into one hard disk system network doesn't necessarily mean that you can literally share access to the same files from different operating systems. Some networks accommodate a degree of file transfer similar to standard telecommunications methods; most, however, need a translation package, such as *MacLink Plus*, to accomplish true compatibility between files.

Centram Systems' TOPS is a network solution that is growing in popularity. TOPS provides a card for the IBM that connects it to the AppleTalk network. Software on both the Macintosh and the IBM PC then allows both systems to access disk drives from other Macintoshes on the system. Since no server is necessary, TOPS offers a relatively inexpensive alternative to the office desiring direct communication between Macintoshes and IBM PCs.

Another network for IBM PCs and Macintoshes is made by 3Com Corp., whose 3-Server hard disk accommodates both AppleTalk on the Macintosh and Ethernet on the PC side. By allowing AppleTalk to connect to Ethernet sys-

tems, 3Com's system opens up many systems to the Macintosh. You can exchange files between Macintoshes and IBMs, but the software does not include any special translation programs. You can spool files to the LaserWriter from either Macintoshes or IBMs. The LaserWriter is usually attached to the server itself via the serial port.

Corvus's Omnet interface (twisted-pair network cables and disk service software) allows Macintoshes and PCs to co-exist on one network. A network card for the Macintosh, the Omnet Transporter, allows communication between the Macintosh and the Omnet Network. The system lets you set up partitions on a hard disk drive and use UNIX-style piping commands to send Macintosh files from one volume to an IBM volume, or to spool files to the LaserWriter.

**MORE MAC-LIKE** It's interesting to note that the IBM seems to be moving in the direction of becoming more Macintosh-like. To prepare for the future and circumvent the need to use a Macintosh for desktop publishing applications, anyone investing in new IBM equipment these days must be sure to include a good graphics display adapter and as much memory as possible, at least 512K bytes, and—oh yes, a mouse.

—Diane Burns and S. Venit

We have been anxious to investigate this new phenomenon for quite a while, and we selected five of the new PC page composition packages for review here: Software Publishing Corp.'s *PFS:Click-Art Personal Publisher* and *Harvard Professional Publisher*, Studio Software Corp.'s *FrontPage*, Ventura Software's *Ventura Publisher* edition in the Xerox Desktop Publishing Series, and Aldus Corp.'s *PageMaker*. (In the final section of this article we also tell you about a pack-

age that comes closest to being a professional typesetting program: Bestinfo's *Superpage II*. Retailing for \$7,000, it's a look at where desktop publishing programs may be headed.)

**ARGUMENTS ON ALL SIDES** Considerable controversy still surrounds desktop publishing. Each vested interest has a different perspective:

Professional designers seem concerned that these low-end products will result in a

flood of poorly designed printed materials that will give them and everyone associated with the printed word a bad name.

Typesetters are concerned that their clients, in exchange for direct control over the end product and considerably reduced production expenses, will make typesetting an in-house function and will willingly sacrifice quality.

Corporate publishing groups are wondering whether these easy-to-learn "lightweights" will be too limited and too slow to meet their heavy production demands.

The controversy surrounding desktop publishing applications is partly a result of all the hype that has accompanied the concept of desktop publishing from the start (see Stewart Alsop's "Desktop Publishing Without Hype" in this cover story). But the hype stops here: page composition programs are not the solution for everyone, and the programs we review here address different users with different skills, different types of output, and different needs.

When we evaluated the new page composition programs, our standard of comparison was the standard in the industry to date: Aldus's *PageMaker* running on the Mac. The question remains: How much power do these PC programs wield in their challenge to the Mac's dominance of the desktop publishing market?

**SELECTION CRITERIA** We selected the five packages we've included in this issue on the basis of the following criteria:

- **WYSIWYG.** Each of these packages lets you work on a WYSIWYG view of the page, though the degree to which the screen display matches the printed page varies somewhat among the packages.

Every package lets you see a full-page view on the screen, as well as an actual-size view; however, some packages will show only "greeked" (illegible) text in the full-page view. Every product shows text characters in closer views of the page, but they vary in how they will allow you to edit the text. For instance, you can edit text directly on the layout with certain programs but must use an edit window in others.

In addition, screen displays may differ from final output because some packages show text in the font in which it will be printed while others display only generic fonts on-screen.

## SPEAKING THE LANGUAGE OF DESKTOP PUBLISHING

*Desktop publishing lingo includes words from the computer and publishing worlds. Here are some of the basic terms and their definitions.*

**Alignment** How text lines up on a page or in a column: align left (flush left or ragged right), align center, align right (flush right or ragged left), or justify (flush on both the left and right).

**Baseline** The baseline of a line of text is the lowermost point of letters, not including descenders (the lower edges of g and j, for instance).

**Bit map** A graphic image formed by a matrix of dots with a specific number of dots per inch. *PC Paint*, *GEM Paint*, *Windows Paint*, and *PC Paintbrush* documents use bit-mapped graphics.

**Blue pencil** Traditionally, a line that will not be printed when a page is photographed for offset printing. Most page composition systems will let you draw nonprinting guides on a page to help you position text and graphics, and these lines will not appear in the layout when the page is printed out.

**Clipboard** A holding place for temporarily storing text or graphics.

**Crop** To trim the edges of a graphic image, thereby removing part of it.

**Dialog box** A window or full-screen display in response to a command that calls for setting options.

**Double-sided** A publication that will be reproduced on both sides of a sheet of paper. The front side of a page is the odd-numbered side; the back side is the even-numbered side.

**Embedded codes** ASCII codes typed directly into a stream of text to identify type specifications. Usually called "embedded codes" to distinguish them from the invisible formatting codes created by some page composition systems. Embedded codes are especially useful when indicating that only one or two words should be **bold** or *italic* within a block of text.

**Flush** See alignment.

**Flush right or right justified** Text in which lines end at the same point on the

right margin; opposite of flush left, ragged right, and left justified.

**Font** One complete set of characters in the same typeface and size, including letters, punctuation, and symbols; 12-point Times Roman is a different font from 12-point Times Roman Italic, 14-point Times Roman, or 12-point Helvetica.

**Footer** One or more lines of text that appear at the bottom of every page.

**Generic font** A representation of alphanumeric characters on a screen that may not reflect what the final printed characters will look like.

**Greeking** Conversion of text to symbolic bars or boxes that show the position of the text on the screen but not the alphanumeric characters.

**Header** One or more lines of text that appear at the top of every page of a document.

**Hyphenation** Hyphenation can be achieved in several ways: some programs let you manually insert "discretionary" hyphens (hyphens that are visible only when they fall at the end of a line of text); some programs insert hyphens automatically based on a dictionary of words; some programs use a logic formula or algorithm to hyphenate words. Usually, dictionary hyphenation takes longer than logical hyphenation but is more accurate.

**H and J** Short for hyphenation and justification.

**Icon** A functional graphic representation of a tool, a file, or a command displayed on a screen.

**Inside margin** The left margin of a right-hand (odd-numbered) page; the right margin of a left-hand (even-numbered) page. The inside margin is often wider than the opposite margin to accommodate binding.

**Invert** See reverse.

**Justified text** Text that is aligned flush at both the left and the right edges. See

also hyphenation and H and J.

**Kerning** Amount of space between letters, especially certain combinations of letters that must be brought closer together than others in order to create visually consistent spacing between all letters. The letters AW, for example, may appear to have a wider gap between them than the letters MN unless there is a special kerning formula set up for the AW combination.

**Landscape printing** The rotation of a page design to print text and graphics horizontally across the 11-inch width of the paper. See also portrait printing.

**Laser printing** Used to describe printing with one of the toner-based laser printers available for PCs, such as the Apple LaserWriter or Hewlett-Packard's LaserJet Plus. Some typesetters also use laser technology in conjunction with their photochemical processing, but these are usually referred to as phototypesetters rather than as laser printers.

**Layout** The arrangement of text and graphics on a page.

**Leaders** Dotted or dashed lines that can be defined for tab settings.

**Leading** The amount of vertical spacing, expressed in points, between the baselines of two lines of text.

**Line spacing** See leading.

**Notepad** A scratchpad area on the screen where you can type text and paste it into a document when needed.

Notepads differ from clipboards in that entries are made to notepads directly rather than by cutting or copying. Notepads don't usually support graphic entries, as most clipboards do.

**Orphans/widows** The first line of a paragraph is called an orphan when it is separated from the rest of the paragraph by a page break. The last line of a paragraph is called a widow when it is forced onto a new page by a page break and separated from the rest of the paragraph.

Widows and orphans are generally considered bad page breaks by most publishers. Some packages let you set up automatic controls that specify the minimum number of lines that can be separated by a page break.

**Phototypesetting** Producing a page image on photosensitive paper, as when documents are printed out on a Linotronic 100 or 300 typesetter. This process is sometimes referred to as cold type to distinguish it from the older method of casting characters, lines, or whole pages in lead, which is called hot type.

**Pica** A unit of measure equal to 1/6 inch, or 12 points.

**Point** Smallest unit of measure in typographic measurement. There are 12 points in a pica, and 72 points in an inch.

**Portrait printing** The normal printing orientation for a page: horizontal text on an 8 1/2-inch-wide sheet of paper. See also landscape printing.

**PostScript** A page description language used by Apple's LaserWriter and other high-resolution printers and typesetters.

**Reverse** The opposite of the normal appearance of text or a graphic image on the printed page. Normally, text and graphics are black on a white background. When reversed, they are white on a black background. Graphics can also be reversed. This option is called "invert" on some systems.

**Resolution** The number of dots per inch used to represent an alphanumeric character or a graphic image. High-resolution images look smoother and have more dots per inch than do low-resolution images. The resolution of images displayed on the screen is usually lower than that of the final laser printout. Laser printers print 300 dots per inch or more; typesetters print 1,200 dots per inch or more.

**Roman Upright (nonslanted)** text styles, as distinguished from italic.

**Rules or ruled lines** Black lines of vari-

ous styles that can be drawn on a page and set to various thicknesses.

**Ruler** Rulers displayed on the screen that show measures against the page layout in inches, picas, or millimeters.

**Running head** See header.

**Sans serif** Typefaces without serifs, such as Helvetica, Avant Garde, and Geneva. See also serif.

**Screen** Gray tone usually identified as a percentage: a 100 percent screen is solid black; a 10 percent screen is light gray.

**Script** Type designed to look like handwriting or calligraphy, such as Zapf Chancery.

**Serif** Line crossing the main strokes of a letter. Typefaces that have serifs include Times Roman, Courier, New Century Schoolbook, Bookman, Palatino, and New York. See also sans serif.

**Single-sided** A publication whose pages will be reproduced on one side of a sheet of paper.

**Size** To make a graphic image smaller or larger on a page.

**Snap-to** The effect—which resembles a magnetic pull—that various types of nonprinting guide lines such as margin guides, ruler guides, and column guides exert on the cursor, text, or a graphic that comes close to the guides. This feature is useful for accurately aligning text and graphics.

**Style** One of the variations within one family of typeface, such as roman, bold, italic, outline, and shadow.

**Style sheet** A collection of type specs and format definitions that can be saved and used in many different documents.

**Text-only document** Text saved without any type specifications or other formatting.

**Text wrap** The ability to wrap text around graphic images on a page layout. Some systems have an automatic text-wrap feature that will shorten lines of text when a graphic image is encountered. In

other systems, you need to change the length of lines by changing column margins or by inserting hard carriage returns to shorten lines.

**Threaded or chained** Blocks of text that are connected together throughout the columns on a page and across pages from the beginning to the end of the article. When you edit threaded or chained text, lines will move across columns or pages to adjust to new text length.

**Trash can** An icon used for deleting files or objects in some systems.

**Vertical justification** The ability to adjust the spacing between lines of text (leading) in fine increments to make columns and pages end at the same point on the page.

**Word wrap** Automatic adjustment of the number of words on a line of text to match the margin settings. The carriage returns that result from automatic word wrap are called "soft" carriage returns to distinguish them from the "hard" carriage returns, which result when the Return key is pressed to force a new line.

**Wrap** See text wrap and word wrap.

**WYSIWYG** What-You-See-Is-What-You-Get (pronounced "wizywig") is a term used to describe systems that display full pages on the screen with text and graphics. Some programs are more WYSIWYG than others in the accuracy of the display. The term is also used to describe word processing programs that display different fonts on the screen.

**Xerox PARC** Xerox's Palo Alto Research Center originated many of the standards for implementation of menus, windows, and icons that are now used by systems like GEM, Microsoft Windows, and the Macintosh, as well as programs like Software Publishing Corp.'s PFS:ClickArt Personal Publisher, Aldus Corp.'s PageMaker, and Ventura Software's Ventura Publisher.

—Diane Burns and S. Venit

## ■ PAGE COMPOSITION

● Price. Every package here is priced under \$1,000.

We assumed that most desktop publishers would be unwilling to spend more on a page composition system than they spent on their database package and that they will be comparing their investment in these packages with the going price of similar products on the Macintosh. Many high-end products, outside of this price range, are available, designed to be used by professional typesetters and large production houses that have typesetting equipment (see the review of *Superpage II* in the article, "Bestinfo's Superpage II: Beyond Desktop Publishing").

● Availability. The package must be available now or at least released by the time this issue goes to press. This criterion eliminated a number of packages that are due to be released shortly.

**THE BASIC EXERCISE** To see how each of the packages handled different features, we designed a four-page newsletter that incorporated a variety of challenging elements. We acknowledge that the packages designed to handle long documents might seem clumsy in handling short documents with a lot of changing formats and that packages that handle short newsletters well might not be able to handle long documents very efficiently. To be fair, we will point out each product's areas of specialization in the reviews that follow.

By design, our short newsletter forced us to use nearly every command on the menu of each of these packages, incorporating the following features:

- The text for each article was imported from *Microsoft Word* (either formatted or saved as a text-only ASCII file).
- The graphic logo was developed in a draw program: *MacDraw*, *GEM Draw*, *Windows Draw*, *AutoCAD*, or any other drawing program supported by the package. For packages that did not support any draw files, we used a paint-type package or a scan, but this would be considered a drawback (since draw-type graphics are usually smoothed when printed to a high-resolution printer but paint-type graphics retain some degree of jaggedness).
- The newsletter incorporates two scanned images: one line art and one half-toned. We used a Microtek scanner and

saved the files in *PC Paintbrush* format in most cases. One package, *PFS:ClickArt Personal Publisher*, even let us convert bit-mapped graphics from the Macintosh. For packages that did not support any scans or paint-format files, we left blank spaces on the page (that is, some paste-up would be required in an actual production environment).

- We used a "clip art" image for a map if available. Otherwise, we scanned the map and the two images mentioned above.
- We included a bar chart from 1-2-3. For packages that did not support PIC files, we used a drawing program or a paint program to create the chart. This latter solution was considered a drawback to some extent: al-

though bar charts are easy enough to draw, a pie chart would have presented considerable problems.

- The newsletter mixes one-, two-, and three-column formats. This common design presented problems for two packages: *PFS:ClickArt Personal Publisher* and *Harvard Professional Publisher*. The former forced a certain flow of text onto a page, and the latter required the document to be set up with the same number of columns on every page. In both cases, we got around these limitations to produce the newsletter as designed.
- Text for the lead article jumps from page 1 to page 4. A second article jumps from page 1 to page 3. We typed in the



## EDITOR'S CHOICE

*The possible applications of desktop publishing are far too broad for one package to be everyone's ideal. As a result, we have chosen two packages, each better suited for a particular kind of publication.*

*The package that is best suited for handling longer publications is Ventura Publisher from Xerox Corp. Users with typesetting and professional publishing backgrounds will appreciate the program's style sheets and its ability to control kerning and leading in decimal increments. Professional authors or publication departments that expect the manuscript to change throughout the production cycle will be grateful for the program's permanent link between the word processing file and the document file and its automatic numbering for sections, figure captions, and footnotes.*

*Ventura's incorporation of downloadable fonts for the Hewlett-Packard Laserjet Plus is especially good news for those of us who were concerned that we would have to invest in a PostScript printer to get more typefaces. This "plus" is related to one of Ventura's draw-*

*backs, however: fonts take up memory, and so the more fonts you use, the smaller your document must be.*

*Our unofficial second choice is Aldus Corp's new PC edition of PageMaker. There were a few bugs in the prerelease version, most notably problems printing bit-mapped images on the laser printer. But PageMaker's intuitive menus and direct methods of text formatting, along with its wide range of fonts, line styles, and fill patterns, make it an ideal package for graphic artists and other nontechnical users. Its pasteboard work area makes it especially easy to experiment with different page layouts before deciding on a final design. We would recommend PageMaker for shorter documents or long documents that will go through minor revisions after page layout.*

*Both Xerox and Aldus are launching extensive training campaigns for their products, giving them a further lead over some of the more-complicated packages reviewed here and making it more likely that new users will be able to reach a high level of productivity and satisfaction quickly.*

"Continued on page x . . ." line if the program could not provide this automatically.

- The newsletter calls for wrapping text around a graphic image in three ways. On page 1, two-column-wide text changes to one column to accommodate a graphic. On page 2, a graphic falls between two columns of text, forcing each into a half-column wrap. On page 3, the text must wrap along the curved outline of a scan of a man's head. Every program let us change the width of the text in order to wrap it, but some also offered an automatic text-wrap feature.

- Two articles opened with initial drop-caps. *Ventura Publisher* and *Harvard Professional Publisher* let us accomplish this through menu selections that were a part of paragraph formatting. In other cases, we wrapped the text around the drop-cap using the same techniques required for wrapping text around graphics.

- The design called for headline rules between columns.

- The running headers and footers on each page include graphics (shaded rectangles) and page numbers. All but two of the packages offered some way of entering running headers and footers with automatic page numbering; where these features were not available, we typed (or copy/pasted) the header and footer and drew the shaded boxes on every page.

- Page 3 includes a table that calls for center-tabbed headings over decimal-tabbed rows of numbers. We were surprised to see how difficult these four lines were for some of the packages.

- All these packages support PostScript printers, and we designed this newsletter for Apple's LaserWriter. Not all printers can handle the range of typefaces and sizes available through the LaserWriter.

The newsletter would have looked very different in most cases if we had designed it to print on a Hewlett-Packard Laserjet, for instance. *Ventura Publisher* has been designed to download fonts to the Laserjet and other non-PostScript printers, but virtually all the other packages would be limited to those fonts that are on the printer's cartridge at the time of printing. (One of the tremendous advantages of PostScript printers over others is that they need to store only one set of characters for each font to print out the full range of sizes.)

## FONTS IN BRIEF: OUTLINE AND BIT-MAPPED

Since desktop publishing software lets you choose varying sizes, shapes, and styles for printed characters, the nature of typographic fonts has become a matter of interest, and of some confusion.

In computer typesetting and in desktop publishing, the term *font* has evolved from its original meaning in typography, in which it's the entire set of characters of one typeface (designed set of characters), in all the styles (roman, italic, and so forth) and sizes (usually 6 to 72 points) in which it is available.

In desktop publishing, the differences between the terms *font* and *typeface* are sometimes blurred, and the terms are used interchangeably, basically because you can manipulate the typefaces to get the elements that make up the fonts. Essentially, a font is considered a basic set of character forms (all of one typeface)—the same as in traditional typesetting—but that can on command be electronically manipulated to create various type sizes, weights, and styles, unlike more-traditional typesetting methods.

Applications programs frequently offer built-in fonts, but increasingly, desktop publishing programs also let you supplement built-in choices with your selections from external font libraries. The United States allows legal protection for font names but not their designs, and so several vendors will often offer essentially the same product under many different monikers.

What's important to note is that vendors of these libraries generally furnish fonts in one of two formats: outline or bit-mapped.

**OUTLINE FONTS** Outline, or vector, fonts are made up of descriptions of the path that should be taken in order to draw each character, and thus they are easy to transform into various sizes, styles, and weights by using standard geometrical processes.

Generally, a dot matrix form of each character in the entire font is computed the first time any member is specified during the printing process. This process, which can take as long as several seconds for each font change, is one reason that some printers run so far under their rated speed when printing complex pages of text.

Most page description languages favor outline fonts because of their flexibility. PostScript, Interpress, and DDL all use outline fonts. (See article on these languages, "Putting Text and Graphics in Their Place," in this issue.)

**BIT-MAPPED FONTS** Bit-mapped, or pixel, fonts are composed of the actual dot sequences needed to form each letter. Bit-mapped fonts are quicker to lay down because they don't have to be computed each time, but it's harder to scale a bit-mapped font up and down or change its weight or style.

Most screen fonts are bit-mapped, because there simply isn't time during the display process to start computing the dots corresponding to the shape of each character.

Along with the actual character outlines or bit maps, commercial fonts will also include a width table (your page composition software uses it to calculate when it is time to end each line of text) and often a coursier version of the font to be displayed on video screens, as well as a higher-resolution version to be used on the printer.

Typographic purists say that you should use a font designed particularly for the resolution and printing technology of your output device, and even that different sizes need slightly different designs. Some printer manufacturers, notably Imagen with its DDL page description language products, claim that they take such factors into account during the character-generation process.

—Steve Rosenthal

## ■ PAGE COMPOSITION

**OTHER CONSIDERATIONS** Besides the features listed above, in every case we examined and evaluated how the package handled leading (spacing between lines) and kerning (spacing between letters)—two topics that most word processors have never heard of but that are especially important to professional typesetters and designers (see our glossary of terms in the sidebar "Speaking the Language of Desktop Publishing").

We also made note of the number of typefaces offered with each package and the differences between their handling of PostScript printers as opposed to other output devices, such as the Hewlett-Packard Laserjet.

In addition, we looked at how each package handled overflow text or graphics that needed to be sized or cropped to fit on the page. We tried editing text in each package, adding and deleting text to see how the package handled text adjustments across columns or across pages. We also tried repositioning text and graphics on the page after it was fully laid out.

**TIMED TESTS** Finally, we used a stopwatch to time a few procedures as a measure of the volume of work each package would be capable of handling in an average day. In some cases, these tests are no more than rough measures of an operator's subjective experience of "speed." The difference of a few seconds in opening or saving a file or turning a page may be a measure of a product's complexity rather than its inefficiency.

On the other hand, if it takes 30 minutes to print a page and you have only one printer, you'd better be sure you won't need to produce more than 16 pages a day.

**TEST ENVIRONMENT** We used an IBM AT with 640K bytes of random access memory, a 30-megabyte hard disk, a Microsoft Mouse, and an EGA card with the Enhanced Color Display.

Some of the packages also support a Hercules card and a monochrome screen, but we did not test this setup.

**IN PERSPECTIVE** As you'll see in this issue, all these packages have certain features in common, but a wide range of features are not shared by all the packages or

implemented as well in every package: each package has its own area of speciality that makes it well suited for certain types of documents but ill suited for others.

No single package stands out as the solution for everyone. A careful analysis of your own needs is in order before you decide which package is best for you.

### **PFS: CLICKART PERSONAL PUBLISHER:** *Visions of Things to Come*

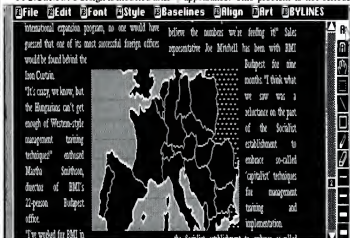
**I**n our first few hours of using Software Publishing Corp.'s *PFS:ClickArt Personal Publisher*, the lowest priced of all the packages reviewed here, we initially experienced what you might have felt for your first car or apartment: the glow of true love. Imagining ourselves to be like those who have used only a word processing program to produce a newsletter or a flyer, we were truly enamored of *PFS:ClickArt*'s simple menus, large fonts, and bit-mapped graphics on a WYSIWYG screen. As with most first experiences, the urge to move on to bigger and better things comes later, but the memory lingers on.

*PFS:ClickArt*'s design is modeled after

that of the Macintosh: drop-down menus, dark text and graphics on a light screen background, mouse operations (optional), an I-beam text cursor, an arrow pointer, and MacPaint-like graphics tools. With the text and the graphics files already prepared, we assembled our four-page newsletter within 8 hours of first entering the Publish command (including several hours of "free play"). This short learning curve proved the manual's claim that with *PFS:ClickArt* page layout is simpler than word processing.

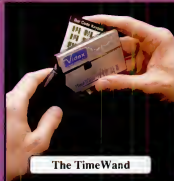
*PFS:ClickArt* has been available since last April, and Software Publishing claims an installed base of over 10,000. Its most common applications are short newsletters and reports, flyers, announcements, display ads, and overhead transparencies.

**FEATURES** You work on *PFS:ClickArt*'s WYSIWYG screen, which shows a part of the page. Although you can display a view of the full page (reduced in size), you cannot edit in that view. The screen image is somewhat distorted because of the PC screen's pixel ratio, which *PFS:ClickArt* does not compensate for; graphics and text appear elongated on the screen compared with their final printed appearance. This problem is not serious



*PFS:ClickArt Personal Publisher does not adjust for the pixel ratio of the EGA, and so the graphics may appear distorted on-screen. This is the case with the map of Europe on page 2 of our newsletter, shown here in the actual-size view. You can access the drop-down menus (see top of screen) using either a mouse or the keyboard.*

# TimeWand™ - Gathering Information



The TimeWand



Scan Part Number



Qty.- 4

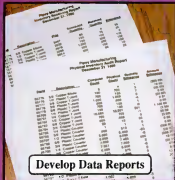
Scan Quantity



Transfer Scan Data



Edit Scan Data



Develop Data Reports

## Bar Codes, Computing, and the TimeWand... a Closer Look.

**"A successful business runs on accurate, timely information."** An obvious statement perhaps, but one that every personal computer user must keep in mind. In order to get the reports we require, we must ensure that the information on which we base our decisions is as up-to-date as possible. This is where a bar code reading system such as the TimeWand can be used to improve efficiency in the office or workshop. The TimeWand provides a convenient way to ensure that your computer has all the facts, all the time.

Let's use inventory control as an example. Once an inventory system is set up on the computer, you are faced with the important task of keeping the inventory up to date. The TimeWand gives you a quick and efficient method of getting information into your computer system. To enter an item into inventory (such as the copper elbows shown above), all you need to do is scan the item, the quantity, and transfer the data to your computer. By using TimeWand, you bypass the time-consuming steps of writing down every transaction, deciphering hand-written notes, typing in each inventory transaction by hand, and searching for transcription errors that might have occurred. The TimeWand is an ideal tool for gathering information for use in your business.

From time-billing to tracking work orders to monitoring security, the TimeWand provides an inexpensive solution for your data collection needs. Call or write Videx today for more information about how the TimeWand can help in your business.

**TimeWand (2K version) - \$198**

**Recharger - \$149**

**TimeWand Communication Software (IBM) - \$299**

Software available for the Macintosh, Apple// family, and Tandy (Model 100 and 200).



1105 N.E. Circle Blvd., Corvallis, OR 97330-4285  
503-758-0521

Videx is a registered trademark and TimeWand is a trademark of Videx, Inc.

## ■ PAGE COMPOSITION

for text, but we had to measure graphics against the ruler line to verify that they were in the correct proportions.

The program lists most commands under the eight drop-down menus across the top of the screen, and you can execute them using a mouse or the keyboard. A mouse is optional for the program, but we found it more convenient than keyboard equivalents for certain functions, such as selecting graphics. All keyboard commands are operable whether or not the mouse is installed.

Since most of *PFS:ClickArt*'s commands are listed on the menus, it was easy to learn the program empirically by trying out different commands. The 170-page manual is very clear; we found it easy to look up answers to our questions.

**TEXT** *PFS:ClickArt* lets you type in text directly or import ASCII text files. Although you can build documents up to 99 pages in length, each individual text file to be imported is limited to 5K bytes, or approximately two pages of text. This limitation and the fact that you must do all of your own character and paragraph formatting in *PFS:ClickArt* make it more suitable for short documents.

You can select the default font for all typed and imported text and then select parts of text to change fonts for headings and captions. Two methods for selecting text are offered: you can drag the cursor over the text or set markers at the beginning and the end of a block to be selected. Once text is selected, you can use the menus to change the typeface, the size, and the style of type or to cut, copy, and paste text through the clipboard.

The Font menu lists the fonts you have moved onto your system using the program's Fontmvr utility. You can load fonts from any *PFS:ClickArt* Letters package, as well as Macintosh fonts telecommunicated from the Mac to the PC (see the sidebar "The Mac and the PC Communicate"), but *PFS:ClickArt*'s menus accommodate only 14 fonts at one time.

The sizes and the styles available will vary depending on the font selected, but the range of possibilities includes nine sizes (between 7 and 48 points) and four styles (normal (roman), bold, italic, and bold italic). You can print the full range of

■ In our first hours of using *PFS:ClickArt*, we initially experienced what you might have felt for your first car or apartment: the glow of true love.

fonts on an Apple LaserWriter or on any PostScript-endowed printer; other printers support only a subset.

Although you can adjust the leading (spacing between lines) to some extent, the program doesn't offer kerning or automatic hyphenation, and you cannot set tabs. Text formatting is slowed because the selection is lost each time a formatting command is invoked; to change a font, make

text bold, and increase the point size, for instance, you need to select the text three times. You cannot select more than a page of text at a time.

**GRAPHICS** You can use *PFS:ClickArt*'s built-in graphics tools to draw ruled lines, rectangles, and free-hand drawings. Ruled lines and rectangles can have one of four different line thicknesses. You can also import MacPaint-like bit-mapped graphics files that are stored in the correct format (that is, converted to *PFS:ClickArt* format and saved under a name with the suffix .ART).

There are three sources of graphics files. First, you can telecommunicate MacPaint files from the Macintosh to the PC in binary format and then use *PFS:ClickArt* to convert them to the appropriate format. (That's how we created all the graphics in our sample newsletter.) Second, you can use the Snapshot utility to make screen dumps from any application on the PC and then use the Snap2Art utility to crop, size, and save the image in the appropriate format.

Finally, you can buy libraries of graphic images, called Image Portfolios, distributed by Software Publishing. (Software Publishing bought *PFS:ClickArt Personal Publisher* from T-Maker, whose first products were *PFS:ClickArt* libraries for the Macintosh. Many of the images now available for the IBM PC have been converted from these Macintosh libraries.)

Once a graphic image is on the page, you can select all or part of it and duplicate it, flip it horizontally or vertically, invert it (reverse black and white pixels), or save it as part of your library. You can also cut, copy, and even paste graphics through the clipboard.

As with text, *PFS:ClickArt*'s graphics features have some limitations. No fill patterns are available for the rectangle tool. No matter how high the resolution of the printer you are using, graphics are always printed with a resolution of 75 dots per inch. And you cannot change the size of a graphic image once it is placed on a program page.

**PAGE LAYOUT** You define basic parameters for each page through the Layout command, including page margins, num-

## PC FACT FILE



**PFS:ClickArt Personal Publisher**  
Software Publishing Corp.  
1901 Landings Dr.  
Mountain View, CA 94039  
(415) 962-8910

**List Price:** Basic program, \$185; LaserJet option, \$79; LaserWriter option, \$79; several font and graphics option packages, \$49.95 each.

**Requires:** 512K RAM, two disk drives, DOS 2.0 or later.

**In Short:** A simple page composition program that is easy to learn and is useful for producing flyers, overhead transparencies, short newsletters, and informal documents with limited formatting requirements. The program lets you import ASCII text created in word processing programs and format it on a WYSIWYG page display. You can incorporate scanned images and screen dumps that are converted to *PFS:ClickArt*'s special format. Not copy protected.

CIRCLE 871 ON READER SERVICE CARD

Now \$999  
monitor & board



## Is this the best monitor for desktop publishing?

### You can make book on it.

Sometimes, you can't tell a book by its cover. And that's particularly true of the new 1280 graphics subsystem by Amdek. It's designed specifically for the high resolution demands of desktop publishing and CAD applications. But it's still completely compatible with all standard IBM PC software.

Amdek's 1280 consists of a high-contrast, non-glare 15" white phosphor monitor and a bit-mapped graphics board. The extra-large CRT can display up to 160 characters per line by 50 lines of text (vs. 80 x 25 for IBM).

Incredibly high resolution, 1280 (H) x 800 (V), plus the use of a 16 x 32 dot character (vs. 8 x 8 IBM standard), result in text and graphics that are remarkably sharp and

easy to read. So, creating high quality flyers, reports, newsletters, bulletins or whatever else you want to "publish" at your desk is as simple as ABC.

The Amdek 1280 is also supported by one of the most popular IBM PC desktop publishing software packages, Clickart by T/Maker. Compatibility with AutoCAD and CADvance gives you full CAD potential. Convenience features include front-mounted operator controls for power, brightness and contrast; and a tilt-swivel base which allows you to select the most comfortable viewing angle.

So, stop the presses—Amdek has done it again! Because everything that's fit to print looks better on an Amdek 1280.

# AMDEK

*Clearly the finest in monitors.*

2201 Lively Boulevard, Elk Grove Village, IL 60007, Phone: 312/364-1180 TLX: 280-803

CIRCLE 197 ON READER SERVICE CARD

## ■ PAGE COMPOSITION



### Page Composition Software: Summary of Features

#### GENERAL FEATURES



Product	PageMaker (Mac version)	PFS:Click! Personal Publisher	FrontPage	Harvard Professional Publisher	PageMaker	Ventura Publisher
Manufacturer	Aldus Corp.	Software Publishing Software	Studio	Software Publishing Corp.	Aldus Corp.	Xerox Corp.
Version	1.2	1.02	1.1	Beta 6	0.804	1
List price	\$495	\$185	\$495	\$695	\$695	\$895
Copy protected	●	○	○	○	○	○
No. of pages per document	16	99	Memory dependent	999	128	Memory dependent
Color options	○	○	○	○	○	●
Hard disk required	○	○	●	●	●	●
Mouse required	●	○	○	○	●	●

#### TEXT IMPORT

ASCII	●	●	●	●	●	●
DCA	N/A	○	○	●	●	○

#### TEXT FORMATTING

Formats in word processor	●	○	●	●	●	●
Converts word processor formats	●	○	●	○	●	●
Imbeds type codes	○	○	●	○	○	○
Style sheets	○	○	●	●	○	●
Dictionary hyphenation	○	○	●	●	○	○
Logic formula hyphenation	○	○	●	○	○	●
Kerning options	○	○	●	●	●	●
Leading increments	Integer	Integer	Decimal	Integer	Half-point	Decimal
Tab	●	○	●	○	●	●
Tab leaders	○	○	●	○	●	●
Maximum no. of PostScript hyphenates	Unlim.	14	Unlim.	Unlim.	Unlim.	8
Maximum no. of PostScript type styles	8	3	4	4	5	8
Size range (in points)	4-127	10-48	4-254	6-72	4-127	1-254
Size increments (in points)	Integers	9 options	Decimal	11 options	Integers	11 options

#### GRAPHICS FEATURES



Product	PageMaker (Mac version)	PFS:Click! Personal Publisher	FrontPage	Harvard Professional Publisher	PageMaker	Ventura Publisher
<b>GRAPHICS IMPORT</b>						
AutoCAD	N/A	○	●	○	●	●
Windows Draw	● (DTC first only)	○	○	○	●	○
GEM Draw	N/A	○	○	○	○	●
Mentor Graphics	N/A	●*	●	○	○	●
Lotus PIC	○	●*	●	●	●	●
Scans	●	○	○	●	● (TIF first)	●
PC Paintbrush	N/A	●*	○	●	●	●
PC Paint	N/A	●*	○	●	●	○
Windows Paint	●	○	○	●	●	○
GEM Paint	N/A	○	○	○	○	●
MACPaint	●	●	○	○	○	○

#### BUILT-IN GRAPHICS ELEMENTS

No. of rules	16	4	Unlim.	8	18	6
Rectangles	●	●	●	●	●	●
Rounded corners	●	●	●	●	●	●
Circles/ovals	●	●	●	●	●	●
Polygons	○	○	●	○	○	○
No. of fill patterns	16	0	34	11	17	0 (color available)
Free-hand options	○	●	○	○	○	○

#### GRAPHICS MANIPULATION

Scaling	●	●*	○	●	●	●
Cropping	○	●*	○	○	○	○
Rotation	○	●	○	○	○	○
Stretch text from Draw	●	○	●	○	●	●
Undo	●	○	○	○	●	●

## LAYOUT FEATURES



### Product

PageMaker  
(Mac version)

PageMaker  
(PC version)

PageMaker  
Professional

PageMaker  
Professional

PageMaker  
Professional

PageMaker  
Professional

PageMaker  
Professional

PageMaker  
Professional

### PAGE LAYOUT

Automatic continued lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Automatic column guides	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Adjust column widths	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Maximum no. of columns	8	4	Unlim	6	20	8
Text wrap for graphics elements						
Automatic	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Manually change column width	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Manually change line width	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Automatic vertical justification	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Snap-to grid	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Headers/footers	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Creators templates	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
No. of ruler measures	3	1	4	2	4	3
Ruler indicator	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Stores text overflow	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Stores unused text/graphics	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Automatic page numbering	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Automatic index generation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Automatic footnoting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

## EDITING FEATURES



### Product

PageMaker  
(Mac version)

PageMaker  
(PC version)

PageMaker  
Professional

PageMaker  
Professional

PageMaker  
Professional

PageMaker  
Professional

PageMaker  
Professional

PageMaker  
Professional

Global edit text	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Global edit type specs	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Global edit paragraph formats	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Inserts/removes pages	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Move page	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Move column	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Undo	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

## PRINTERS SUPPORTED



### Product

PageMaker  
(Mac version)

PageMaker  
(PC version)

PageMaker  
Professional

PageMaker  
Professional

PageMaker  
Professional

PageMaker  
Professional

PageMaker  
Professional

PageMaker  
Professional

PostScript-compatible printers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
HP LaserJet Plus and compatibles	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Xerox 4045	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
AST TurboLaser	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Epson 24-pin (LD 1600) and compatibles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maximum no. of printers allowed during session	32	1	1	59	5	5



—Indicates Editor's Choice. ●—Yes ○—No Unlim—Unlimited  
N/A—Not applicable; in the Mac version, PageMaker does not import PC files.  
\*Unless provided with the program, Snapshot and SnapStart are used to import and edit graphics.  
†Without automatic page numbering, removing pages from the document stream is uncomplicated.  
‡Of the five possible printer connections, only one can be for a laser.

## ■ PAGE COMPOSITION

ber of columns of text (up to four), gutter width between columns, line point spacing (leading, or space between lines), and paragraph format (flush left, flush right, centered, or justified). Typed or imported text automatically falls within the bounds specified through this command. Once text is on the page, you can vary these settings for all or part of the text using the baselines feature and the Align menu commands.

The baselines feature lets you adjust the width of all or part of a column by dragging either edge of the column left or right. You can also adjust the spacing between lines individually by dragging each line of text up or down. The Align menu lets you reformat part of the text to be flush left, flush right, centered, or justified. It also lets you change the vertical alignment (line point spacing) between lines for parts of the text.

Another mixed blessing is the automatic threading of text through columns: on a three-column page, for instance, the flow of text is down each full column in sequence. This is exactly what you want when the entire page is composed of one article, or when each article on the page is supposed to jump to the top of the next column when it fills a column. Many newsletters don't follow that format, though, including page two of our sample newsletter.

For instance, if you want to divide a page in half, making one article fill all three columns in the top half of the page and a second article fill three columns in the bottom half of the page, you need to cut and paste to interleave the two articles: part 1 of article 1, followed by part 1 of article 2, then part 2 of article 1, part 2 of article 2, and so forth. This process is only slightly inconvenient in the first place, but it can become a significant irritation if you need to edit the articles very much after they are arranged on the page; you may find lines from article 2, for example, drifting into article 1 at the top of column 3 if an edit adds a line to a paragraph.

You can jump an article from one page to another as you are working, or you can fill one page and leave continuation text in an invisible overflow area for that page, returning to pick it up when you find the right position for it on a later page. If you leave two unfinished articles on one page, they

### ■ *PFS:ClickArt* is a good package if you want to try desktop publishing on a small scale.

will be stacked in the overflow area in the same sequence they appear on the page; you will need to cut and paste some text if the two articles are not supposed to jump to the same page later in the newsletter.

One of *PFS:ClickArt*'s useful features is the PictureWrap command. You can position a graphic image on top of text in a column, then invoke the PictureWrap command to make text automatically reformat, changing the width of the lines that fall alongside the graphic image to wrap around it.

As already noted, you can see a portion of the page while you are working, representing an area approximately 8½ inches wide and 3½ inches long. You can display horizontal and vertical ruler lines on the screen to help you position text and graphics. To check the overall page layout, you can call up a view of the full page, but no edits can be made in that view.

*PFS:ClickArt* has a number of page layout limitations. You can print only horizontally on an 8½- by 11-inch page; you cannot design pages to print sideways or to larger sheets of paper. There is no automatic page-numbering facility, and you cannot set up running headers and footers. (The manual recommends that you store headers and footers as text or graphics files and place them on each page as you come to it.)

### EQUIPMENT AND INSTALLATION

*PFS:ClickArt* will run on an IBM PC, XT, AT, or compatible with at least 512K bytes of RAM and running DOS 2.0 or later. It requires two disk drives and a graphics card. A mouse is optional since every command and movement operation has a keyboard alternative.

The package comes with two system disks (one for color monitors and one for

monochrome monitors with a Hercules graphics card). The disks include programs for installing the program on a Hercules system, installing on a hard disk, installing the printer driver, and installing fonts from the fonts disk. Once the program is installed, you start it simply by typing "publish."

**PRINTERS** *PFS:ClickArt* supports the Apple LaserWriter, the Canon Laser LBP-8 A2, the C-Itoh 8510 SC, the Data Products SPG 8050/8070, the Epson MX/RX/FX/LX/JX and LQ1500, and the HP Laserjet and Laserjet Plus. Laser option packages for laser printers are an extra-cost item at \$79 each.

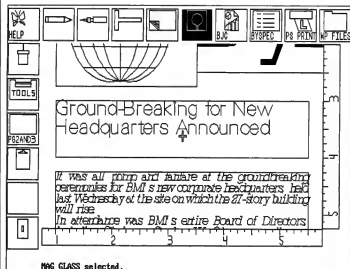
### A SOLID STARTER PACKAGE

*PFS:ClickArt* offers a good value for the price, especially if you're looking for an easy way to produce short newsletters with no columnar tables, quick flyers and announcements, and overhead transparencies—all documents that *PFS:ClickArt* can handle easily and well.

This simple, effective program is also a good beginner package if you want to try desktop publishing on a small scale before investing in a hard disk, more memory, and a higher-end page composition package with more capabilities, such as Software Publishing's own *Harvard Professional Publisher*, which is also reviewed here. If you find the easy-to-use *PFS:ClickArt Personal Publisher* too cumbersome, you'll know that desktop publishing may not be for you. If, on the other hand, you find yourself infatuated, you'll know that you're on the road that leads to bigger and better—and more-expensive—programs that require more skill but yield more-sophisticated results.

### FRONTPAGE: An Eccentric Hybrid

**F**rontPage has evolved. It's a direct descendant of Studio Software Corp.'s *Do-It* program, which we reviewed a year ago as one of the only WYSIWYG typesetting programs available for the IBM PC (see "PCs and Typesetters: A Mixed Marriage," *PC Maga-*



FrontPage supplies a "magnifying glass" for you to view pages up close. Notice that the generic screen fonts give only an approximation of the typefaces that will appear in the final printed newsletter. A palette containing various tools and files surrounds the work area on two sides. The rulers (bottom and right) clearly indicate the actual size of the image area.

zine, Volume 4 Number 25). Since then, Studio Software has replaced *Do-It* with three products: *FrontPage*, *FrontPage Plus*, and *FrontPage to Type*.

For this review we examined *FrontPage*, the standalone package that runs on the PC and prints to a wide range of laser printers, as well as PostScript typesetting equipment from Linotype. (The other two packages are designed to work with high-end typesetting systems such as AM Varityper, Autologic, and Compugraphic and require an initial software investment of over \$3,000.)

*FrontPage* is a hybrid in the sense that it is a basically menu-driven WYSIWYG page composition system that offers the option of embedding codes directly in text files. In other words, you can format text in *FrontPage* by selecting options in a table of type specifications or use a word processing package to prepare the text, embedding codes such as `/heading1/` or `/body copy/`.

When coded text is brought into *FrontPage*, it is automatically formatted according to the specifications set up in the

type spec table. This ability to set codes in any word processor is a tremendous advantage for those who want to distribute the tasks associated with typesetting to stations that do not have the *FrontPage* program.

*FrontPage* is eccentric in the sense that it does not follow the basic standards for implementation of menus, windows, and icons that have evolved out of research done at Xerox PARC—standards that are followed by other programs reviewed here, such as *PageMaker*, *Ventura Publisher*, and *PFS: ClickArt Personal Publisher* (as well as operating environments like *GEM*, *Microsoft Windows*, and the *Macintosh*). This eccentricity won't be apparent to those who work with *FrontPage* alone, but it could prove to be a disadvantage in the long run if software manufacturers continue to shift over to Xerox PARC standards for other PC applications.

For instance, *FrontPage* does not have drop-down menus; instead, you click graphic icons shown in small frames to activate a tool, display a new window with more icons, or display a dialog box where

parameters can be set. The text window has a scroll bar for moving through a text file, but the page window uses a special scrolling tool to move around on the screen. You generally see only one option at a time when scrolling through multiple-choice lists; rather than viewing all the options at once and simply clicking on the one you want, you must scroll through the list one item at a time in alphabetical or numerical order.

The package comes with a tutorial that required about 3 hours to complete, and we had to work with the manual close at hand to build our newsletter. We were able to produce the basic newsletter layout with all the text as specified, but we had to leave blank spaces for some of the graphics since the current version of *FrontPage* does not support bit-mapped images. (A new release slated for the first quarter of 1987 promises to support a wider variety of graphic images.)

**FEATURES** The *FrontPage* screen displays a work area that's framed by a "palette" of 16 small frames along the top and left edges of the screen where various resources can be stored. Initially, seven of the frames are already filled with a help icon, a toolbox, a drawer for files, a "book" of forms, a clipboard, a trash icon, and an on/off switch. The toolbox includes printer drivers and 17 different tools: rulers, a pen, fill patterns, Wite-out, a blue pencil, a magnifying glass, and many others. The file drawer includes text and graphics files, page layouts, and type spec sheets.

Before you can use it, you must move a tool or a file out of the toolbox or drawer into one of the empty frames on the palette. Since there are so many tools and files to choose from and only nine empty frames, you need to swap resources in and out of these little windows frequently as you are working. You can empty some frames by moving some of the initially displayed tools into the toolbox, and you can put the toolbox in the file drawer or vice versa.

We found we had to swap tools and files frequently in the process of building our newsletter. This slowed us down considerably since the screen is redrawn at least twice in any single swap operation. One convenient feature is that you save a

## ■ PAGE COMPOSITION

particular palette as an "environment" along with your document; this way, the set of tools you last used is redisplayed when you next open the same file.

The work area on the screen contains one of four different types of views at any given moment: a view of the page (or pages) you are building, a dialog box for setting or changing parameters in response to a command, an iconographic display of the contents of the toolbox (or a file drawer or folder), or a line editor screen for text. You can arrange text and graphics in the page views, but you must set type specs and edit text in the line editor view.

You work on a WYSIWYG view of your page in three different views: full-page views of a 16-by-11-inch area (that is, two pages at a time), full-page views of eight pages at a time, and enlarged views of any area you select (in any percentage). Most commands (except text editing) operate in all three views. In full-page view, text is "greeked" (not legible) to show position only; you can adjust the point size threshold below which text is greeked.

If not greeked, text is displayed in two generic fonts (serif and sans serif) that roughly approximate the position of characters on the page, but you cannot otherwise distinguish between different typefaces in the screen views. The screen redraw for these fonts is extremely slow. (The next release of *FrontPage* will include screen fonts from Bitstream that will yield much more accurate and speedy screen displays of text.)

A mouse is optional for *FrontPage* operations; we could not test the keyboard alternatives since they are disabled if the mouse is implemented. Using the mouse option, most tools and files are activated by a unique clicking procedure: you click one of the windows on the screen, drag it to position its top-left corner over another window, and then click again.

Multiple-choice selections in dialog boxes also have a unique implementation. For example, on the type specs screen where you change the point size, you can see only one point size at a time. To change the size, you roll the mouse in a vertical direction and watch the point size selection change in increments of a tenth of a point. When you reach the desired new point size, you press Enter.

■ *FrontPage* is a hybrid in the sense that it is a menu-driven WYSIWYG page composition system that offers the option of embedding codes directly in text files.

You can pull in text or graphics from other programs or enter them onto a page directly by using *FrontPage*'s tools. The number of pages you can create depends on how much memory your system has and how complex your document is.

**TEXT** Text can be typed directly into *FrontPage* through the typewriter notepad (one of the tools in the toolbox) or pulled in from unformatted ASCII files created in other word processing programs. Characters are formatted by preceding selected text with a "callout" such as /heading 1 or

/body text/. You enter these callouts by clicking the mouse on menued selections in line editor mode or typing them into the ASCII file before you bring the text into *FrontPage*.

The typeface, type size, leading (spacing between lines), and paragraph alignment (such as left, centered, and justified) associated with each callout is defined in a type spec table. Type size and leading can be specified in decimal increments, up to a type size of 216 points (for printers that support it).

The list of typefaces displayed on the type spec table depends on the printer you have installed. If you make changes to the type spec table after text is flowed into elements on the page, you must delete the contents of each element and reflow the text to incorporate the changed specs.

Each different character/paragraph format used in a document must have a callout defined for it. This type spec feature (also called style sheet in some other systems) makes *FrontPage* a useful tool for producing a series of documents that use the same format (such as a series of newsletters or chapters in a book). You can open a new document and load the same type spec table you used in other documents. You can also change the type specifications by loading a different type spec file for a document, but you will need to reflow the text to make the new specs apply.

Each tab position requires a callout that identifies the starting position of the tab. You must arrange your tab callouts in consecutive order on the type spec table: the column 2 callout must follow the column 1 callout, for example. You insert tabs in text by pressing the Tab key, inserting a vertical rule character (/), or inserting the callout identification (/column 1/).

When *FrontPage* encounters a tab or a vertical rule in the text, it automatically goes to the next callout on the type spec table. You can insert carets in the text to get special effects: entering two carets ("aa") causes the entry to be centered; "\$####" left justifies the dollar sign and right justifies the number; "#####" draws a single rule at the baseline, "#####" draws a double rule at the baseline.

Not all text is hyphenated and kerned: the rule is that text identified with one of the first six callouts on the type specs list is

**FACT FILE**



**FrontPage**  
Studio Software Corp.  
17862-C Fitch St.  
Irvine, CA 92714  
(714) 474-0131  
List Price: *FrontPage*,  
\$695; *FrontPage Plus*,  
\$1,295; *FrontPage to*  
*Type*, \$1,495.  
**Requires:** 512K RAM, 10-Mbyte hard disk,  
math coprocessor, DOS 2.0 or later.  
**In Short:** *FrontPage* is a WYSIWYG page  
layout program with iconographic menus. It  
lets you embed typesetting codes in text files  
for automatic formatting when they are con-  
verted into *FrontPage* text files and accepts  
images from a few graphics programs.  
*FrontPage* is difficult to learn and awkward  
to operate. Revisions may be forthcoming,  
but for now, at least, there are better choices.  
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CIRCLE 199 ON READER SERVICE CARD

## ■ PAGE COMPOSITION



### Performance Tests: Page Composition Software

**O**ur performance tests for page composition software are designed to show the time it takes to perform common tasks, such as saving a file. We

tested the programs using one of two versions of our newsletter: version 1 contains text only, version 2, text plus all of the graphics the package could handle.

#### FILE SIZE

File sizes ranged from 39K to 129K without graphics, 69K to 102K with graphics. Some packages show relatively small sizes for the version of the newsletter that contains graphics. These packages could not incorporate all of the graphics in the file. Of the packages reviewed only Ventura Publisher and PageMaker accepted every graphic in the form specified by our original design: scans, drawings, and PIC files. RFS:ClickArt Personal Publisher makes are entirely bit-mapped (and therefore require less memory in storage). The developer of Harvard

Professional Publisher promises that the final release will accept bit-mapped and PIC files (but not drawings). Had the prerelease Harvard "with graphics" been able to include in its file two of the bit-mapped images in our newsletter, the file size would be even larger than 592K. FromPage accepted drawings and PIC files but not bit-mapped paint images or scans.

Harvard, FrontPage, and Ventura store a document in many parts that might be shared with other documents, such as style sheets, text, and graphics files. We added up the individual file sizes of all elements to get the total size of each document in these packages.

The size of the document has particular significance for making backups on floppy disks: if a 4-page document requires 50K, then a 32-page document might fill a 400K floppy disk. Even if a program technically lets you create 99-page documents, it's unlikely that such a large document would be practical with any of the packages reviewed here. Large publications would be especially significant for packages that tend to redraw the screen after every command. The extremely fast times for ClickArt's screen redraw are due to the fact that the actual size is always displayed and that the full-page view that appears on-screen lacks detail and allows no editing.

#### OPEN/SAVE A 4-PAGE FILE

This test begins after the program is started and ends with a display of page 1; these times therefore include redrawing the screen. With FrontPage, starting the program and opening a document cannot be separated and the time is appropriately longer. With Harvard, opening a document and displaying a page is a two-step process; however, this does not significantly affect the time.

The time required to save a document can become significant during production if you like to save your work often (as we do). We considered it a big plus to discover that Harvard saves documents automatically as you work.

#### REDRAW PAGE 1

Screen redraw was timed by switching from actual-size view to full-page view. The time required to redraw a page becomes especially significant for packages that tend to redraw the screen after every command. The extremely fast times for ClickArt's screen redraw are due to the fact that the actual size is always displayed and that the full-page view that appears on-screen lacks detail and allows no editing.

In the process of working on the newsletter we discovered that "turning" from one page to another took as long, and in some cases longer, than redrawing the screen.

Where complex layout and graphics were involved (both factors influence time), FrontPage, Harvard, and PageMaker (Mac version) were 60 to 70 percent slower turning a page than redrawing a screen.

#### PRINT TO LASERWRITER

The time it takes to print a document could be the most significant variable in a heavy production environment. Even though Apple declares that the LaserWriter is capable of printing 6 pages per minute, the fact is that pages composed with any page composition product always take longer to print than pages from a word processor. Pages with many font changes take longer than pages with one font, pages with graphics take longer than pages without graphics, and bit-mapped images may take so long to print that you may decide never or rarely to use them.

This times shown should be taken as rough guides only; those pack-

ages with lower printing time may, in fact, not be able to handle graphics. FrontPage cannot import bit-mapped graphics (scans), for instance, and Harvard cannot import graphics from CAD packages (BIM logo). ClickArt printed considerably faster than Ventura, accepts bit-mapped images, but will print out at only 75 dots per inch. In ClickArt's case, faster printing time is offset by lower resolution. The ability to print bit-mapped images was not available in the prerelease versions of Harvard or PageMaker. Because of these differences, it is probably not fair to judge each program against the rest on printing time alone.

(Times given in seconds except where noted)

Product	File size		Open a 4-page file		Save a 4-page file		Redraw page 1		Print to LaserWriter (minutes/decimal minutes)	
	Text only	Text and graphics	Text only	Text and graphics	Text only	Text and graphics	Text only	Text and graphics	Text only	Text and graphics
PageMaker (Mac version)	39K	69K	6	11	12	17	4	5	2.5	11.4
PFS: ClickArt Personal Publisher	51K	69K	33	33	55	61	2	2	15.1	47.5
FrontPage	128K	183K	33	41	23	28	9	12	6.2	7.9
Harvard Professional Publisher	30K	592K	20	27	Auto	Auto	14	16	6.1	N/A
PageMaker	78K	106K	20	22	3	11	5	6	4.5	N/A
Ventura Publisher	47K	313K	15	26	4	17	4	12	5.0	72.1

N/A—Not available in prerelease version.

never hyphenated but always kerned. Text identified with one of the callouts after the first six is always hyphenated but never kerned. The assumption here is that the first six callouts will be headline callouts, while all the rest will be body copy (in various fonts and formats). The kerning formulas are built into FrontPage, but you can adjust them through a FontEdit utility.

Text can be hyphenated using three options: manual, auto, or auto+flag. Under manual hyphenation, FrontPage prompts you to hyphenate words it cannot find in the dictionary. Under auto-hyphenation, FrontPage uses rules of logic to hyphenate words it cannot find in the dictionary. Under auto+flag, FrontPage prints a plus sign at the end of each line where rules of

logic were applied so you can proof for hyphenation errors before you print the final document. You can create your own dictionaries of special words.

All text editing must be done on the line editor display of text file; you cannot change text that appears in the WYSIWYG page views. The line editor is exactly what the name implies: you can edit only one line at a time. When you click on a line of text, that line is displayed for you at the bottom of the screen. You move the mouse vertically to scroll through a list of options, such as insert, replace, newline, linedel, accept, and reject. You move the mouse horizontally to scroll along the line of text and then click to position the cursor and make edits.

**GRAPHICS** FrontPage provides built-in graphics tools for drawing lines, rectangles, and polygons. You can specify any width for ruled lines and borders in decimal point sizes and select from 34 different fill patterns. Fill patterns are listed by number on the menu; you can't see what the pattern is until you select one. (Fill patterns aren't shown in the manual either, but you can build and print out your own reference sheet.)

If you want to change a fill pattern once you've specified one for a graphic object, you need to use the Wite-out tool to erase the first one before selecting another. If you set up a dark fill pattern behind text, the text is automatically reversed to print as white lettering on the dark background.

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CIRCLE 127 ON READER SERVICE CARD

## ■ PAGE COMPOSITION

*FrontPage* can display rulers at the right and the bottom of the work area, showing either picas or inch measures. When the rulers are displayed, a snap-to effect is created along an invisible grid of lines at intervals equivalent to the increments of measure shown on the rulers (which may be user-defined). To turn off this snap-to effect, you must remove the ruler display.

You can import graphics created with other programs, including 1-2-3 (PIC files), *Freelance*, *AutoCAD*, or any graphics package that generates HPGL formats. Imported graphics can be scaled up or down on the page.

**PAGE LAYOUT** You lay out pages with *FrontPage* by using the blue pencil tool to draw frames (or elements) on a page (or board) and filling them with text or graphics that are pulled in from other programs or entered directly, using *FrontPage*'s tools. Once you have defined it, you can save a board and pull it out for other pages as needed, in the same or other documents. To create a long document with the same format on every page, you could store the board on the palette and pull it out every time you added a new page, for example. *FrontPage* has no running header/footer feature and no automatic page numbering; you must type in the page number manually on every page.

When placing a long text file on a page, you have four options for chaining the text from one element (or column) to the next: you can fill each element before going to the next element, go to the next element whenever a specified callout is found, pause at each new callout and let the operator decide whether to go on to the next element, or none of the above (in other words, do not chain the text in one element with the text in another element). When text is chained, an edit made in one element will cause text in subsequent elements to flow forward or backward, whichever is appropriate.

One of *FrontPage*'s most remarkable features is an automatic copy-fitting option: you can specify a range of type sizes and leading values for a callout and let *FrontPage* determine the final type size and line spacing based on the amount of text and the size of the element in which it

---

■ *FrontPage* imposes certain rules and restrictions that are difficult to rationalize: Why does hyphenation exclude kerning, for instance?

---

is placed. When filling text, *FrontPage* tries various sizes within the range until it finds the best size to fill the space. (Printers with fixed-size capabilities do not allow the copy-fitting feature for point size.)

If you place one element inside another, the text in the outer element will automatically wrap around the inner element. You can also move elements around on a page—before or after filling them with text and graphics. You can use a "lucy" tool to change the size of an element proportionately.

The nonprinting borders that define elements on the page look the same as the printing borders around rectangles at first (that is, solid black lines) unless you override the defaults set up for line display. You can change the color of the different types of lines for the screen display through the Console form, but *FrontPage* has no color printing feature.

*FrontPage* lets you specify any paper size up to 99 by 99 inches, but it always assumes that you are printing on 8½- by 11-inch sheets; if you specify a larger paper size, *FrontPage* automatically divides up the design into sections and prints it out on the smaller sheets.

### EQUIPMENT AND INSTALLATION

*FrontPage* will run on a 512K IBM XT with DOS 2.0 or later, a 640K AT with DOS 3.0 or later, or any other compatible computer with a 5-megabyte hard disk. It requires a CGA, EGA, or Hercules graphics card (and compatible monitor, of course), as well as a math coprocessor. A

mouse is optional but recommended. The manual also recommends as much as 3 megabytes of main memory for AT systems and as much as 20 megabytes of hard disk space. Because our 640K system includes a Quad card with an additional 512K, *FrontPage* had access to over 1 megabyte of main memory.

The package comes on seven disks; the program is installed automatically in about 15 minutes using the installation program provided, which prompts you to identify the monitor, printer, port, and extended memory in your configuration. Once *FrontPage* is installed, you simply type "do" to start the program.

**PRINTERS** *FrontPage* runs with any PostScript-compatible printer or typesetter, including the Apple LaserWriter or LaserWriter Plus and the Linotronic 100 and 300 typesetters. It also runs on Hewlett-Packard's 7470A plotter, LaserJet or LaserJet Plus, or the AST TurboLaser.

**FEATURES AND INTERFACE** To be fair, *FrontPage* incorporates most of the features one looks for in a page composition system: a WYSIWYG screen display, the ability to merge text and graphics on a page, automatic hyphenation, and output to high-resolution printers and typesetters. The fact that it does not incorporate running headers and footers and automatic page numbering are serious drawbacks for producing long documents, however, and the absolute clunkiness of the line editor makes it imperative that the text is thoroughly edited while it is still in the word processing cycle.

However, the program is sometimes awkward to operate even after you have learned the basics. You must constantly bring new tools and files out of a drawer and place them on the palette before you can use them—a very time-consuming process and a real disadvantage when production is under a tight deadline. The most common error messages were either monosyllabic beeps or the uninformative "Sorry, but I don't know how to move that there!" or "Sorry, but there's nothing there!" No Undo command is available to help beginners out of the many inadvertent changes that are possible with the slightest

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## ■ PAGE COMPOSITION

incorrect movement of the mouse.

The manual itself is difficult to follow and short on practical examples. It devotes only 18 lines to an explanation of how to adjust the kerning formulas, for example, using a font called FONT0123.k01, without showing a table of font names or mentioning the font names shown on the type specs tables, such as Times and Helvetica.

*FrontPage* imposes certain rules and restrictions that are difficult to rationalize: Why does hyphenation exclude kerning, for instance? Why are the position and sequence of callout in the type specs table so critical for hyphenation, kerning, and tabs? Why do you have to turn the ruler lines off in order to turn off the snap-to-effect of elements on graphic objects? Why can't you see the fill pattern until you select a number? And why the awkward line editor for text?

Some users may find that *FrontPage* offers enough powerful features to override any concerns about its interface. But if you have time to wait before investing in page composition software, stay tuned: the next release of *FrontPage* may solve some of the problems with the current version.

## HARVARD PROFESSIONAL PUBLISHER:

### Upward Mobility

As its name implies, Software Publishing Corp.'s *Harvard Professional Publisher* offers many sophisticated features that are characteristic of high-end typesetting programs. But it's not only its name that gives it a superior air—*Harvard Professional Publisher* also has an auspicious ancestry.

But *Harvard Professional Publisher* bears no resemblance or relation to its lesser sibling, Software Publishing's low-end offering in this category: *PFS:ClickArt Personal Publisher*. Whereas *PFS:ClickArt* is extremely easy to learn and use, its features are also extremely limited (see review in this article). *Harvard Professional Publisher*, on the other hand, offers a number of advanced features that make it correspondingly harder to learn at first and, in the long run, harder to use. Moreover,

their menu structures and implementation are completely different, and so you can't convert documents from one to another. This isn't surprising, though, since Software Publishing bought them from two different manufacturers: *PFS:ClickArt Personal Publisher* from T-Maker and *Harvard Professional Publisher* from Bestinfo.

*Harvard Professional Publisher* is actually a junior version of Bestinfo's *Superpage II* (see review). These two products are related, and so you can prepare *Harvard Professional Publisher* documents for conversion into *Superpage II*. This fact alone will justify the purchase of *Harvard Professional Publisher* by many who already have some connection with a typesetter who uses *Superpage*.

Like *FrontPage* and *Ventura Publisher*, also reviewed here, *Harvard Professional Publisher* is a menu-driven, WYSIWYG system that offers the option of embedding codes directly in text files. Coded text is automatically formatted according to the specifications set up in the format file selected for the current document. You can, therefore, distribute the tasks associated with typesetting to stations that do not have *Harvard Professional Publisher*.

The package, which we reviewed in beta-test version, comes with a Quick Tour tutorial that required only an hour to complete, and we learned enough to get a good head start in building our newsletter before we had to refer to the reference manual. We were able to produce our basic newsletter layout with all the text as specified, but all of the graphics except the 1-2-3 PIC-format bar chart were scanned or done using a paint-type program because *Harvard Professional Publisher* does not support draw-type drafting packages.

**FEATURES** *Harvard Professional Publisher* roughly follows all of the basic standards for the implementation of pop-down menus and windows that evolved out of Xerox PARC, making it similar to *PageMaker*, *Ventura Publisher*, *PFS:ClickArt*, *GEM*, *Microsoft Windows*, and the Apple Macintosh. None of the screens use scroll bars, however (a minor inconvenience).

*Harvard Professional Publisher* opens

with a display of the main menu, listing six options: lay out document, define page style, print document, import files, set defaults, or exit to DOS. One of the default settings is the name of the directory in which all files related to one document are stored. Such related files include the document itself, all text files used in the document, all graphics files used in the document, one or more page styles, and a format file. It's a good idea to move all your files into one directory, therefore, before starting the program. (The installation program sets up other directories where the program, printer drivers, font files, and other pieces are stored.)

*Harvard Professional Publisher* links the document file to all related text files, and changes made to text in the document are automatically reflected in the text files (and vice versa).

The layout screen displays the document in one of four views: full page, actual size, reduced 50 percent, or enlarged 150 percent. Text is displayed on the screen in a generic sans serif font that accurately reflects the relative size and position of the characters. Graphics are shown accurately in the close-up views, but on the full-page view complex scans are shown as empty



## FACT FILE



**Harvard Professional Publisher**  
Software Publishing Corp.  
1901 Landings Dr.  
Mountain View, CA 94039  
(415) 962-8910

List Price: \$695

Requires: 640K RAM, hard disk drive, DOS 2.1 or later.

**In Short:** A junior version of the high-end typesetting program *Superpage*. The program lets you insert embedded codes in any text file for automatic formatting when flowed into the WYSIWYG screen display. Edits made in *FrontPage* are linked to original text files (and vice versa), and it allows you to incorporate PIC files (such as 1-2-3 graphs) and bit-mapped images (scans and point files). Overall, it's an ideal tool for creating long documents on a regular basis. Not copy protected.

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# Anatomy of a true WYSIWYG\* monitor

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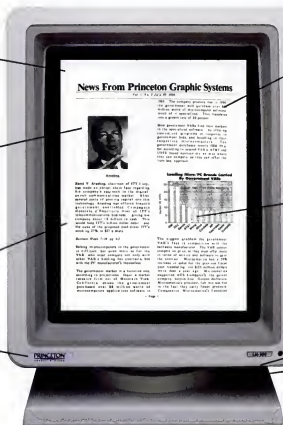
Superb detail enhanced with four shades of gray—ideal for newsletters, manual updates, etc.

## Flickerless Display—

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**PRINCETON**

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CIRCLE 209 ON READER SERVICE CARD

## ■ PAGE COMPOSITION

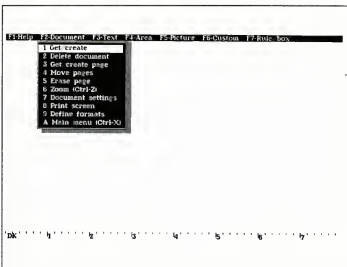
boxes for position only. Commands are executed using drop-down menus that are listed along the top of the screen. Commands that result in a dialog box or list of options (that is, most commands) result in a complete redraw of the page, and we found that this one factor slowed us down considerably.

A mouse is optional but recommended; we found that we used the keyboard alternatives easily and often for many of the commands. *Harvard Professional Publisher* makes use of both buttons on a mouse; for example, you use the left button to position the upper-left corner of a graphic image or a block of text, and the right button to position the lower-right corner. Different clicking sequences let you toggle from the menu line to the page layout area of the screen.

*Harvard Professional Publisher* displays rulers at the right and bottom of the layout screen, showing inch measures with tick marks 1 pica apart. Whenever you are defining an area on the screen (in positioning text or a graphic image), dotted-line indicators are displayed on the ruler to show the exact position of the pointer. This especially helpful feature should be standard for all page layout products, but two of the products reviewed here, *Ventura Publisher* and *PFS:ClickArt*, don't include it and it's an optional tool in a third product, *FrontPage*.

You can pull in text or graphics from other programs or enter them directly onto a page using *Harvard Professional Publisher*'s tools. Text (other than unformatted ASCII files) and graphics must be converted, using the Import Files option of the main menu, before they can be placed on the page. The maximum number of pages per document is 999.

**TEXT** You can type text directly into *Harvard Professional Publisher* through the custom text feature, but this is intended for very short blocks of text such as headlines. Most text is pulled in from unformatted ASCII files created in other word processing programs or from files saved in DCA format. Characters are formatted by preceding selected text with a tag such as <heading1> or <bodytext>—names of eight characters or less enclosed in angled brackets. You can enter these tags by



*Harvard Professional Publisher's page layout screen displays the page in any of four views (full page, actual size, enlarged, or reduced). Commands are executed using drop-down menus, and all text editing and formatting is performed in an edit window. Harvard automatically updates the text files based on any changes made to the text in the working document.*

clicking the mouse on menued selections in edit mode or by typing them into the text file before you bring it in to *Harvard Professional Publisher*.

To preserve some of the formatting, such as boldface and italic, you can convert text files created in word processing programs that use DCA format. Otherwise, all text formatting and editing is done in the edit mode window; you cannot make changes to the text directly on the layout screen.

A tag specification includes the typeface, type size, leading (spacing between lines), and paragraph alignment (such as left, centered, or justified), plus any of five degrees of condensation/expansion between letters. You can also set up a tag to create a ruled line above a paragraph or to create an initial drop cap at the beginning of the paragraph. Eleven different point sizes are listed on the menu (ranging from 6 to 72 points), and leading can be specified in 1-point increments. The list of typefaces displayed on the type spec table depends on which ones you have loaded, but there is a limit of eight fonts per document:

two typefaces in four styles each.

Each different character/paragraph format used in a document must have a tag defined for it in the format file. This stylesheet feature makes *Harvard Professional Publisher* well suited for producing a series of documents that use the same format (such as a series of newsletters or chapters in a book). You can open a new document and load the same page-style specification file you used in other documents.

One annoying aspect of the product's implementation: if you are in the edit window when you realize that you need to set up a new tag, you must exit the edit mode, select the Define Formats command, create a new tag by naming it and filling in three or four dialog boxes with option selections, and then return to the layout display and remind *Harvard Professional Publisher* what page you were on when you last left the edit mode. Only then can you reactivate edit mode, scroll to the point in the text where you left off, and use the new tag you just created.

Of course, you can enter bracketed codes in the text while you are editing and

set up all the new tags later if you like, but undefined tags will display as question marks on the screen, and you won't see what the text will look like until you define the missing tags.

Text is automatically hyphenated and kerned when it is flowed into a document. *Harvard Professional Publisher* offers no tabbing capabilities.

**GRAPHICS** *Harvard Professional Publisher* has built-in graphics tools for drawing lines and rectangles. You can select from eight widths for ruled lines and borders (from .5 to 12 points) and select from 11 different fill patterns, or tints (percentage of screen from 0 to 100 in 10 percent increments). To change a fill pattern or line width once you've drawn a graphic object, you need to delete the graphic and redraw it. You can reverse text to print as white lettering on a dark background.

You can import graphics created in other programs, including 1-2-3 (PIC files), *Windows Paint*, *PC Paintbrush*, *PC Paint*, *CompuScan*, *Datascopy*, *DEST*, *Dr. Halo*, *Harvard Presentation Graphics*, or any graphics package that generates HPG or TIFF formats. Imported graphics can be scaled and moved on the page.

**PAGE LAYOUT** Before starting a document, you must define one or more page layouts through the main menu's Define Page Style command. Page style definition includes the number of columns, up to three lines of text for the running header and footer, and graphic elements (ruled lines and boxes).

Each page style is saved as a file and can be used in any number of documents. A single document can have two different page styles—one for odd-numbered pages and one for even-numbered pages—but both page styles must have the same number of columns. "Continued on page x..." is added to the bottom of a column automatically if you jump the text past the adjacent column or onto another page. (This would be a convenience for most publications, but it led to some problems with our sample newsletter.)

You have two options in flowing a long text file into a document: flow into selected (sequential) columns on the current page or flow to every page. Once text is flowed,

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## ■ *Harvard Professional Publisher* offers the serious user many features that make it an ideal tool for producing long documents on a regular basis.

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you can define areas for graphics and reflow the text; alternatively, you can place the graphics first and flow the text afterward. In either case, you can mask off areas of pages to force text to wrap around these areas. Besides wrapping text around rectangular masks, you can actually define amorphous "runaround" areas to shape text around nonrectangular graphics, such as the portrait we used on page 3 of our newsletter. This last feature is found exclusively in *Harvard Professional Publisher*.

*Harvard Professional Publisher* offers Column Balance and Stretch to Fit options to accomplish vertical justification of text. You can design pages to print on 8½- by 11-inch paper in either portrait or landscape mode.

**EQUIPMENT AND INSTALLATION** *Harvard Professional Publisher* will run on a 640K-byte XT or AT with 2 megabytes of free space on a hard disk. It requires an EGA or Hercules graphics card and compatible monitor. As noted earlier, a mouse is optional but recommended.

The package comes on nine disks, plus two demo disks; the program is installed automatically in about 15 minutes using the installation program provided, which prompts you to identify whether you have an XT, an AT, or a compatible machine and whether you have a PostScript printer or an HP Laserjet.

If *Harvard Professional Publisher* is going to be your primary program, the manual recommends that you modify your AUTOEXEC file to specify

PATH=\\HPUB. You must be in the HPUB directory to start the program.

**PRINTERS** *Harvard Professional Publisher* runs with any PostScript-compatible printer or typesetter, including Apple's LaserWriter or LaserWriter Plus and the Linotronic 100 and 300 typesetters. It also runs on Hewlett-Packard's Laserjet or Laserjet Plus. *Harvard Professional Publisher* files can be converted to *Superpage* files to access other typesetting equipment, but *Harvard Professional Publisher* does not support these other output devices directly.

**RELIABLE WORKHORSE** *Harvard Professional Publisher* offers the serious user many features that make it an ideal tool for producing long documents on a regular basis. The program is too complicated to be inviting to casual users who just want to bang out a few overhead transparencies, and it is not really intended to serve the "electronic designer" who wants to experiment with font changes or to see a page with two columns and then see what it would look like with three columns.

It's clear, however, that once you learn the program and get used to entering the formatting codes in your word processing files, *Harvard Professional Publisher* will be a reliable workhorse.

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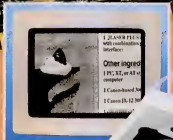
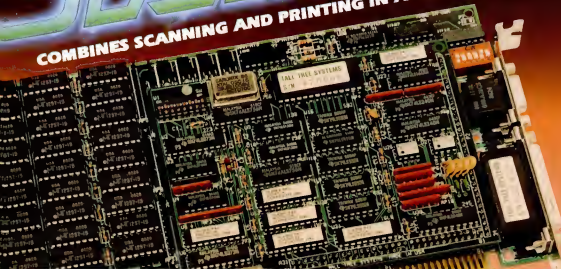
## PAGEMAKER: *A Designer's Dream*

Aldus Corp.'s *PageMaker* is the program that got desktop publishing off the ground. Designed initially for the Macintosh and the Apple LaserWriter printer, *PageMaker* set all the minimum standards for page composition products: simple menu commands, WYSIWYG page displays, the ability to incorporate text and graphics from other programs, and the ability to output to high-resolution printers and typesetters.

Last November, Aldus formed an alliance with Microsoft and Hewlett-Packard to establish the desktop publishing solution for the IBM PC and compatibles, thereby further ensuring *PageMaker* a prominent place in the PC market. With its short but

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## ■ PAGE COMPOSITION

genuinely illustrious history, we can expect *PageMaker* to attract attention from potential desktop publishers who are wondering which package to buy for their PCs. It remains to be seen, however, whether *PageMaker* can really be the solution for everyone, especially in view of the extra features offered by some of its competitors.

**FEATURES** *PageMaker* enables you to work on a WYSIWYG view of your page in three different views: normal size (actual size), reduced (to 50 percent, 75 percent, or a full-page view), or enlarged (200 percent). All of the commands and editing functions remain fully operational in all three views.

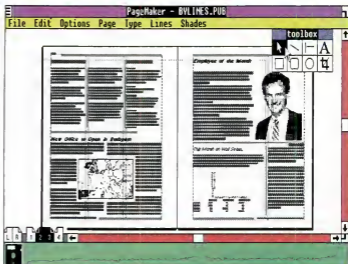
Each view offers a fairly accurate representation of what you will actually be outputting on your laser printer, including representations of different fonts on the screen. (Smaller point sizes are illegible in the full-page view.)

Commands are listed under eight drop-down menus across the top of the screen. Also, a movable toolbox is displayed on the screen, containing tools that let you create some simple graphics (lines, boxes, circles, and so forth), crop a graphic image, or switch into text mode for editing or formatting text.

The program requires a mouse, though it offers Ctrl-key shortcuts for commonly used menu commands. Most of the commands and dialog boxes are so clear that we rarely had to refer to the manual once we had gone through the tutorial. Because our newsletter was originally designed using *PageMaker* on the Macintosh, it was relatively easy to build on the PC: the program looks and "feels" the same on both machines (though the IBM version adds a few features that are not yet available on the Macintosh).

Pages are laid out by creating columns on a page and filling them with text or graphics that are pulled in from other programs or entered directly through *PageMaker*. The maximum number of pages you can create in one file is 128, but you can assign any number as the starting page for the different document files that will compose a large publication.

The IBM version of *PageMaker* incorporates an automatic hyphenation feature



*PageMaker on the PC has the look and feel of PageMaker on the Macintosh. The toolbox, in the upper-right corner of the screen, makes adding regular geometric shapes, rules, and fill patterns easy. PageMaker also allows you to work interactively on a two-page spread. Notice that when looking at pages in the full-page view, the smaller type sizes are "greeked" in. It should be obvious from the screen, but PageMaker is the only program reviewed in this issue that runs under Microsoft Windows.*

and lets you control character spacing (kerning)—two features that are not yet available on the Macintosh.

**TEXT** You can type text directly into *PageMaker* or import it from other word processing programs such as *MultiMate* and *Word Perfect*. Text from most word processors will automatically be set in the default font, with bold and italic preserved from supported programs. Text created in *Microsoft Word* retains different typeface and size specifications and tab settings.

You change character or paragraph formats (including tabs) by selecting parts of the text and making menu selections. Any text within a block can be selected by dragging the mouse pointer over it, and the program has shortcuts for selecting whole words, lines, paragraphs, blocks, and entire articles.

The typefaces *PageMaker* uses include all the fonts supported by the *LaserWriter* Plus and the *Laserjet* Plus: Avant Garde, Bookman, Courier, Dingbats, Helvetica, Line Printer, Modern, New Century

Schoolbook, Palatino, Script, Souvenir, Symbol, Times, and Zapf Chancery.

A *PageMaker* menu lists 13 point sizes, from 6 to 72, but you can specify any point size from 4 to 127 and set leading (line spacing) in half-point increments. (In this way you can adjust leading to make blocks of text fill a defined area, but *PageMaker* offers no automatic vertical justification feature.)

*PageMaker* accommodates any combination of six styles of type for most typefaces: normal (roman), bold, italic, underline, superscript, and subscript. The program can produce any text in black or white (reverse), and a menu selection converts selected text to all caps or small caps. You can set four types of tabs (left, right, center, and decimal) and four different paragraph alignments (left, right, center, justify). You can also select from three types of tab leaders or specify your own leader character.

All text is automatically hyphenated against a dictionary, unless you opt to turn this feature off or request prompted hy-

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There is no question we have met our every objective by developing and manufacturing the **BREAKTHRU 286** card. This is the best designed and most functional speed up card available today. We guarantee it.

**HERE IS WHAT MAKES IT SO SPECIAL.**

First, it installs so easily. It is a half slot card, only five inches in length. You don't even have to give up a full slot. What's more, unlike competing products it works in the Compaq and most clones. The instructions are so simple we considered showing a picture of a child putting it in. Easy diagrams show how you just place the card in an open slot, remove the original processor and connect a single cable. There is no software required. From that moment you are running faster than an AT.

Second, it is advanced. The **BREAKTHRU 286** replaces the CPU of the PC or XT with an 80286 microprocessor that

is faster than the one found in the AT. A 16K cache memory provides zero-wait-access to the most recently used code and data. In benchmark tests the card accelerated software programs—both custom and off-the-shelf anywhere from 200% to as much as 700%. Wow!

Third, you have full compatibility. All existing system RAM, hardware, and peripheral cards can be used without software modification. It operates with LAN and mainframe communication products and conforms to the Lotus/Intel/Microsoft Expanded Memory Specification (EMS). Software compatibility is virtually universal.

Fourth, it is the best there is. There are several other boards on the market. Some are priced about the same as the **BREAKTHRU 286** and some are cheaper. We at PCSG have compared them all, but there simply was no comparison. What we discovered is that many cards being sold offer only a marginal speed up in spite of their claims. We found some to be merely versions of the obsolete 8088 or 8086, and others to be just poorly engineered. The 8MHz **BREAKTHRU 286** is unequivocally the best executed and most completely reliable speedup board manufactured today.

PCSG has since early 1983 dominated the lap portable market with ROM software such as Lucid spreadsheet and Write ROM that reviewers rated as excellent. We were proud to successfully enter the IBM PC market last year with disk access speedup software. Now we are so pleased with the **BREAKTHRU** speedup card. We use them on our own PC's to make them faster than AT's. We are really excited about this product.

PCSG makes the unabashed statement that the **BREAKTHRU 286** card represents more advanced technology than boards by Orchid, Quadram, Victor, Mountain, P.C. Technologies, Phoenix... we could go on.

But an ad can't let you experience it for yourself. That's why we sell the **BREAKTHRU 286** on a 60 day trial. If you aren't completely satisfied return it within 60 days for a full refund. It is priced at \$395. Call today with your MasterCard, Visa, American Express or COD instructions and we will ship your card the very next day. CIRCLE 489 ON READER SERVICE CARD

**PCSG**

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**214-351-0564**



## ■ PAGE COMPOSITION

phenation. You cannot alter the kerning table itself, but you can set the minimum point size for kerning selected paragraphs; this can help you cut down on the time the kerning process takes. *PageMaker* lets you specify minimum and maximum percentage values for spacing between words and letters. For example, the default setting for maximum word spacing is 200 percent; in other words, when justifying text, *PageMaker* will not allow more than two full spaces between two words.

You can also set the range of the hyphenation zone. Unlike most of the other products reviewed here (with the exception of the less expensive *PFS:ClickArt Personal Publisher*), *PageMaker* does not offer a style-sheet function, whereby you can define the character and paragraph formats for one document and use the same specifications in other documents. The style-sheet feature seems to go hand in hand with the ability to enter embedded codes in the text files from any word processor, another feature that *PageMaker* does not support.

These drawbacks are offset somewhat by the fact that you can format text directly on the page layout in *PageMaker* (without going to a special edit window). Once text is placed in *PageMaker*, there is no connection between the *PageMaker* document and the source of the text.

**GRAPHICS** *PageMaker* is particularly intuitive when it comes to graphics, which are generally easy to build, change, size, crop, and store. The program's toolbox provides built-in graphics tools to simplify the job of drawing lines, rectangles (with squared or rounded corners), circles, and ovals.

You can select from 18 different line thicknesses or styles, each available in either black or white. Seventeen fill patterns are available, including transparent and white. Line styles and fill patterns are easily changed.

You can import graphics created in other programs, including *AutoCAD*, *1-2-3*, *Windows Draw*, *Windows Paint*, *PC Paint*, and *PC Paintbrush*. You can import scanned images if they have been converted to TIFF or *PC Paintbrush* file format. *PageMaker* allows you to scale and crop all graphics on the page.

## ■ IBM version of *laker* incorporates features that are not available on theintosh.

**LAYOUT** You can specify any size in *PageMaker* up to 17 by 22 but you cannot change these specifics once you start building the document. You can print in either portrait or landscape mode.

While you are working on a document, you can position text and graphics directly on the page or store them on a pasteboard, a work area on the screen that surrounds the paper edges. You can also use the *Microsoft Windows* clipboard feature to cut, copy, and paste text and graphics within *PageMaker* or from other programs into *PageMaker*.

The overall paper size and page margins are defined on the Page Setup dialog box, and these settings affect the entire document's appearance. You can automatically divide a page into equal columns, or customize your layouts by making

several columns different widths.

With *PageMaker* you can set up column guides page by page or define columns on a master page, along with running headers, footers, automatic page numbering, and other elements that will appear on every page (such as headline rules between columns). Headers and footers can have any number of lines of text and can include graphics, such as ruled lines, boxes, or graphics imported from other programs.

Documents that are set up for double-sided printing have two master pages: one for left-hand (even-numbered) and one for right-hand (odd-numbered) pages. You can suppress master page elements and column settings or change them on individual pages as needed.

Ruler lines can be displayed at the top and the left of the page, showing inches, picas, millimeters, or ciceros. Column edges and page margins have a snap-to effect for aligning text and graphic objects, and nonprinting horizontal and vertical guide lines can be positioned anywhere on the page and have a snap-to effect as well. You can turn the snap-to effect on and off by a menu selection.

When placing text on a page, you can jump it to any other column on a page or to any page. You can change the width of a column or block of text by dragging the edge of the block. The length of text in a column can be adjusted by dragging the bottom of the column up or down.

*PageMaker* lets you wrap text around graphic objects by breaking the column into separate blocks of text and changing the width of each block of text. You can reposition blocks of text and graphic objects on a page by dragging them with the mouse. Adjustments that you make to text in one column will automatically affect the positioning of lines in the following columns or pages.

**EQUIPMENT AND INSTALLATION** *PageMaker* will run on an IBM XT or AT, a Hewlett-Packard Vectra PC, or any AT compatible. It requires at least 512K bytes of RAM (640K bytes is recommended), a hard disk, an EGA graphics card, and a mouse.

The package comes on five disks, and you can install it automatically in only 15 minutes using the installation program.

**FACT FILE**



**PageMaker**  
Aldus Corp.  
411 First Ave. South,  
#200  
Seattle, WA 98104  
(206) 622-5500  
List Price: \$695  
Requires: 512K RAM  
(640K recommended), one floppy disk drive,  
one 10-Mbyte hard disk, *Microsoft Windows*, DOS 3.2.  
**In Short:** Easy-to-learn program that runs under *Microsoft Windows* and gives the PC a Macintosh-like interface. Includes some sophisticated features for full document production and makes a good design tool. Not copy protected.  
CIRCLE 670 ON READER SERVICE CARD

## ■ PAGE COMPOSITION

*PageMaker* comes with a run-time version of *Windows*, or you can run it under a full version of *Windows* to take advantage of the multitasking feature that would let you switch from *PageMaker* to *Windows Paint* or *Draw* and back again without quitting the program.

**PRINTERS** *PageMaker* will work with any printer that has a driver supplied by Microsoft with *Windows*. This class of printers includes any PostScript-compatible printer or typesetter (such as Apple's LaserWriter or the Linotronic typesetters) and Hewlett-Packard's Laserjet or Laserjet Plus.

You can specify any number of different printers during installation (up to the five-port limit of the PC), but switching one document between printers isn't easy. Remember: the available typefaces vary among printers, so you can't switch from a LaserWriter (PostScript fonts) to a Laserjet (cartridge fonts) unless you were careful to use only a few sizes of Times and Helvetica in the first place.

You can switch more easily between two PostScript printers—from a LaserWriter to a Linotronic typesetter, for instance—with only minor differences between the two outputs.

**EXCELLENT AND EASY** Even with the many features it offers, *PageMaker* is one of the easiest products to use of those reviewed here. You can spend an hour with the tutorial and be fully equipped to produce simple documents immediately. Casual users who find that they use *PageMaker* only a few hours or days a month—to produce a newsletter, for instance—will find it easy to get back up to speed quickly using *PageMaker*'s straightforward menus.

The program's pasteboard feature—not offered by any other product in such a convenient form—and its wide range of line styles and fill patterns make it an excellent tool if you want to create a design from scratch or experiment with different alternatives on the screen. More than any other package reviewed here, *PageMaker* has the feel of a product designed by a designer rather than a programmer or a typesetter.

Undoubtedly, there will be some desktop publishers who consider

*PageMaker*'s elegant simplicity insufficient justification for what it lacks in flexibility: You cannot enter detailed formatting codes in ASCII files from any word processor, for example. You can't specify decimal increments in leading or point sizes. You can't tamper with the kerning tables. You can't create style sheets and reformat whole documents. And *PageMaker* offers no automatic footnoting or section-numbering feature.

As you can see in these reviews, *PageMaker* is getting a lot of competition from newer products made by manufacturers that have been able to borrow the best parts of *PageMaker*'s implementation on the Macintosh and add some features that *PageMaker* lacks. Nevertheless, by virtue of its famous cousin in the Macintosh family, *PageMaker* on the PC is likely to have a tremendous psychological advantage over other products in this category for quite some time. It remains to be seen what the market really wants, and who will serve it.

## VENTURA PUBLISHER: Beauty and Brains

Xerox Corp.'s *Ventura Publisher* offers the best of both worlds in page composition software, combining ease of use with sophisticated features that make it a suitable tool for producing long documents as well as short flyers and newsletters. (See *First Looks*, page 33, *PC Magazine*, Volume 5 Number 22, for *PC Magazine*'s first review of *Ventura Publisher*.) While *Ventura Publisher*'s \$895 price may seem high when compared to that of other packages on the market, its power, coupled with its ability to run on a PC-XT, makes it a solid investment for PC desktop publishers.


From the time we loaded the package, it took us about 8 hours to assemble our newsletter. *Ventura* isn't as easy to learn as some other packages. Instead of simply groping intuitively through the menus, we had to go completely through one or two of the tutorial modules before we could get very far, and even then we had to work with the manual in hand. We were able to produce our newsletter as designed with


only minor compromises (see sample).

*Ventura* incorporates style sheets that let you define the font and the format of repeating elements such as body text and major heading. You can change the format of an entire document by simply modifying the style sheet (a feature of many word processing packages, most notably *Microsoft Word*); you don't have to change the text itself. *Ventura* comes with over 20 style sheets for specific documents, such as letters, reports, books, newsletters, magazines, price lists, and tables. You can easily add new style sheets tailored to your own documents.

*Ventura* lets you control character spacing (kerning) and line spacing (leading) in decimal increments. It will automatically number your chapters and up to eight levels of headings, as well as footnotes and figures. It allows you to specify the minimum number of lines to be isolated in widows or orphans. It lets you import text in six different file formats, and edits made later in the source file will be reflected in the *Ventura Publisher* publication and vice versa.

The *Ventura* package is the only one we reviewed in this issue that offers color options for both text and graphics. Color is most likely to be useful for preparing color presentation materials rather than color publications for extensive distribution, pri-

**FACT FILE**



**Ventura Publisher**  
Xerox Corp.  
1301 Ridgeview Dr.  
Louisville, TX 75067  
(800) 822-8221  
List Price: \$895  
Requires: 512K RAM  
(640K recommended),  
one hard disk, DOS 2.1 or later.

**In Short:** A page composition program whose sophisticated features, combined with ease of use, make it suitable for producing long documents and newsletters. The program lets you insert codes in the word processing program and incorporates graphics from a wide range of programs. Edits made in *Ventura Publisher* are linked to original text files (and vice versa). It downloads fonts to laser printers. Not copy protected.

CIRCLE 88 ON READER SERVICE CARD



# Harvard Profes is better in t

Introducing the one desktop publishing program to help you look your best in the long run—and the short run. New Harvard Professional Publisher has all the important features you need to produce truly professional documents on your IBM PC, from one page, to ten pages, to hundreds of pages.

HPP handles virtually all the details automatically. Just develop your own style sheet and create a page design. Then Harvard Professional Publisher automatically flows text for page after page, placing headlines, subheads, continuation messages and page numbers along the way.

While you concentrate on your

message, HPP concentrates on giving it maximum impact, with sophisticated typographic systems, like widow and orphan control, automatic leading, vertical justification and column balancing.

But, when you want choices, HPP really delivers, too. Interactive on-screen editing lets you make

**AUTOMATIC KERNING AND TRACKING**  
*Achieve a truly professional look, with automatically tightened letter-spacing. HPP's tracking function goes even further, by tightening large type, too.*

#### **AUTOMATIC CONTINUATION MESSAGES**

*Automatically flows text from one page to another, inserting "continued on" and "continued from" messages. If layout is revised, page referral numbers are automatically updated.*

#### **HYPHENATION AND BEST-FIT JUSTIFICATION**

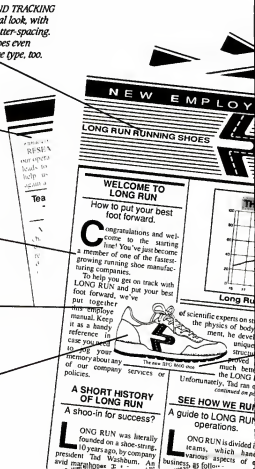
*Automatically seeks optimum word spacing, letter spacing and hyphenation using both dictionary and algorithmic methods, for a sophisticated, professional appearance. Widow and orphan controls, too.*

#### **IRREGULAR RUN-AROUNDS**

*Effortlessly flows type around irregular images, using variable word-spacing and automatic hyphenation controls for superior results.*

#### **SCANNED IMAGES**

*Imports, enlarges and reduces scanned line art and photographs, plus images created with free-drawing programs like PC Paintbrush.*



# sional Publisher he long run.

revisions on the spot. And HPP's "WYSIWYG" display lets you place all text with pinpoint accuracy.

Choose from a variety of type faces, styles and sizes. Even foreign and mathematical character sets are no problem.

Plus, with HPP you can adjust leading, design with reverse type,

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## **AUTOMATIC PAGE STYLE FORMATTING**

Set up a page style once, and HPP will follow it automatically, inserting headers, footers, rules and boxes. Even different styles for left and right pages.

## **IMPORT CHARTS FROM LOTUS 1-2-3**

Easily incorporates spreadsheet print files and charts from Lotus, plus high-quality Harvard Presentation Graphics images.

## **AUTOMATIC PAGE NUMBERING**

In addition to placing page numbers automatically, HPP can handle a variety of numbering systems like section/page definitions and more.

## **CAPTIONS ANYWHERE, EVEN ACROSS COLUMNS**

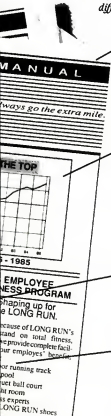
With HPP, it's easy to instantly place text — any place you want it.

## **HANGING INDENTS**

Automatically creates hanging and paragraph indents, in addition to automatic alignment of lists and bullet points.



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## PLAYING CATCH-UP WITH THE MAC

*PC owners might be on the winning team in the state-of-the-art desktop publishing game, after all.*

Desktop publishing systems on the IBM PC, XT, or AT have the potential to exceed the desktop publishing capabilities of the Apple Macintosh.

*PageMaker* feels (and in its final release should look) virtually the same on both systems, and other PC products are incorporating the drop-down menus and window systems made popular by the Macintosh. At the same time, operating environments, such as *GEM* and *Microsoft Windows*, are creating standard interfaces that are being used by more and more products. IBM PC users finally have the necessary tools to integrate text and graphics from a wide assortment of programs.

Will the PC take over the desktop publishing market that has been initiated by the Macintosh? The answer may hinge on whether the people seeking out desktop publishing capabilities are current PC users or people with no prior

computer experience or investment.

If you don't already own a computer, full desktop publishing on the IBM will require a larger investment than the same capabilities on the Macintosh. Even if you do have a computer, you might be looking at a significant investment in order to start publishing: those starting with 256K bytes of RAM and one floppy disk drive will need to upgrade to 640K, a hard disk, a graphics card and monitor, and probably a mouse. This short list of add-ons will cost \$1,500 to \$2,000. If you already have an XT or AT, you can match the Macintosh's capabilities easily, without much additional expense.

**LEARNING CURVE COSTS** If the cost of training and support is a major issue for your staff, then the Macintosh still has an edge over the PC. The Mac's often-criticized "closed architecture" allows an average person to plug in the

Mac and a LaserWriter and press a few buttons to install the whole system.

By comparison, installation of the PC products reviewed here requires more-technical expertise: installation of a graphics card and a mouse, knowing which protocol to use for the printer, and setting bit-per-second rates for communications lines.

You'll be several steps ahead of the game if your staff already knows how to use the wide variety of programs on the PC that go into the publishing cycle—word processing, graphics, spreadsheet charting, and image scanning. The Macintosh has an advantage at the moment because most of its programs share a common interface that is easy enough for anyone to learn, while products on the IBM lack a standard operating environment. This issue is likely to disappear over time as more and more products work under *GEM* or *Microsoft Windows*.

bles, for example. A more complex document will require more tags, one for each different combination of paragraph format, font, and tab settings. You can define function keys for commonly used tags to speed up the formatting process. The collection of tags defined for a document is saved as a style sheet. A change to any tag will result in changes to all paragraphs that carry that tag, and you can change all tags by loading different style sheets.

The style-sheet feature makes *Ventura Publisher* an excellent tool for producing a series of documents that use the same format (such as a series of newsletters or chapters in a book). The fact that the tag includes options for drawing ruled lines around a paragraph makes it easy to define graphic conventions for setting off chapter openings or boxed notes, for example. This feature enables designers to develop several different versions of a layout with ease to present to their clients or management and lets a marketing department, for example, easily change to a new typeface

in all their existing brochures.

Initially only four typefaces appear on the menu: Times, Helvetica, Courier, and Symbol. You can use utilities provided for adding more typefaces, including all the LaserWriter Plus typefaces designed by Adobe and others designed by Bitstream to print on the Hewlett-Packard Laserjets and the Xerox 4045, such as Avant Garde, Bookman, Century, Dingbats, Friz Quadrata, Garamond, Lubalin, Optima, Palatino, Souvenir, and Zapf Chancery.

To display characters on the screen and print each character correctly, information about each font's width and height must be stored in a width table for the document. Width tables are stored in memory while you are working on a document; the bigger the width table, the smaller the document can be. In practice, you can save space by creating a different width table for each publication, loading only those styles, sizes, and weights needed for that job. The technical demands of adding more fonts and managing memory space may prevent

some users from taking advantage of *Ventura Publisher's* extended font list.

All text is automatically hyphenated, unless you opt to turn this feature off as part of a tag specification. The program handles hyphenation by using a computer algorithm. A small dictionary overrides the algorithm where the algorithm is known to fail. The algorithm method of hyphenation is very fast compared with lookup methods, though it may miss opportunities for hyphenating words. You can add your own terms to the dictionary.

Another useful feature that makes *Ventura Publisher* an ideal tool throughout the production cycle is that changes made to text in the *Ventura Publisher* file are automatically reflected in the original word-processing file and vice versa. Thus, you can make global changes through the word processing program (since *Ventura Publisher* does not have a global search feature) and edit your text to fit copy on the *Ventura* page, and all of your changes will be reflected in both files.

**PC LOYALTY** Putting aside the issues of training and initial expense, it is clear that the PC is well on its way to eliminating the lead the Macintosh has achieved in desktop publishing applications over the past 2 years. Current PC users can participate in the desktop publishing revolution without switching their loyalty from IBM to Apple. They don't even have to trade in their HP Laserjet for Apple's LaserWriter, provided that they invest in a page composition product, like *Ventura Publisher*, that supports downloadable fonts for the Laserjet.

The processing of long documents, of 100 pages or more, can be done more efficiently on the PC than on the Macintosh. Both word processing and page composition software available for the PC incorporate generic style sheets and other aids for producing lengthy publications. This is not currently true for the Macintosh.

IBM users are also at a distinct advantage when it comes to available peripherals. Large-screen displays, scanners, and laser printers proliferate for the PC, if at some cost to compatibility. Macintosh users have a narrower range of products from which to choose.

Beyond that, the makers of desktop publishing products must address the needs of the corporate business community: a community that is heavily populated with IBM PCs and compatibles.

Hardware and software advances have enabled the PC to access typesetting quality text and graphics. We expect to see pressure mounting in favor of desktop publishing applications from the entire spectrum of PC users—as both the corporate community and individuals learn that desktop publishing is a tool that can be used to enhance and clarify printed communications.

—Diane Burns and S. Venit

are available, and you can also specify a color for each of the patterns and indicate whether they should appear opaque or transparent.

You can import graphics created in other programs, including Autodesk's *AutoCAD*, Lotus's *1-2-3*, Mentor Graphics' *PC CAD*, Digital Research's *GEM Draw* and *GEM Graph*, and Z-Soft's *PC Paintbrush*. You can import scanned images if you have converted them to *GEM* or *PC Paintbrush* file format. *Ventura Publisher* can scale and crop bit-mapped images on the page. Menu selections let you create ruled lines above, below, or around graphics and drop shaded backgrounds behind them.

We found two annoying shortcomings to *Ventura*'s graphics. If you are working in an actual-size view, the screen, by design, does not scroll as you draw an object. Also, line art cannot be cropped, which means that images in some graphics libraries, which frequently appear with more than one per file, must be separated in the

program that generated them, not in *Ventura Publisher*.

**PAGE LAYOUT** *Ventura Publisher* lets you specify six different paper sizes and print in either portrait or landscape mode. The overall page layout includes several design aids: the "underlying page" is a full-page frame that defines the page margins and basic column settings that apply to every page in the document and are stored as part of the style sheet. Individual, smaller frames on the page can also have margins and columns settings that apply only to the text or graphics included in those frames. Column edges can have a snap-to effect on frames, and you can set up a nonprinting grid of lines with a snap-to effect as well.

Any text or graphic image placed on the underlying page will appear on every page of the document unless you selectively delete it from individual pages. You can also define headers and footers that will appear on every page unless selectively suppressed. Headers and footers can contain up to two lines of text and include automatic page and chapter numbering. When you select double-sided printing, you can specify different headers and footers for left- and right-hand pages, as well as different indent settings for paragraph tags.

In placing text on a page, you can jump it to any other column on the page or to any other page. You can specify the minimum number of isolated lines for automatic control of widows and orphans. You can change the width of a block of text by dragging the edge of the frame that holds that text. If you drop a new frame on top of an existing frame or column of text, the text will automatically wrap around it (unless you opt to turn the wrap feature off).

**EQUIPMENT AND INSTALLATION** *Ventura Publisher* will run on an IBM PC, XT, or AT, a Xerox 6065, a Compaq, or any other compatible. It requires at least 512K bytes of RAM (640K bytes is recommended), a hard disk, a graphics card, and a mouse. The program uses 1 to 3 megabytes of disk space, depending on the printer fonts installed.

*Ventura Publisher* comes on 11 disks, but the package's installation program installs the program and all its directories

The program incorporates an automatic indexing feature that you can implement during the word processing stage or even later, after the text has been placed on the page. Indexed terms are identified by bracketed strings of codes that appear in the word processing file.

While style sheets may be *Ventura*'s single most powerful feature, the fact that no paragraph formats may be assigned without a tag could be a drawback when dealing with some documents. If a report included 50 tables with different tab settings, for example, you would have to generate 50 different tags for the tables alone, most likely a cumbersome process. A "no tag" option might be useful.

**GRAPHICS** *Ventura Publisher* supplies built-in graphics tools for drawing lines, rectangles (with squared or rounded corners), circles, ovals, and boxed text. You can specify any width for ruled lines and borders and select from eight colors (including black and white). Nine fill patterns

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## ■ PAGE COMPOSITION

automatically in only 15 minutes. *Ventura* is bundled with a run-time version of Digital Research's *GEM*, which is transparent to the user; you launch the program from DOS, not *GEM Desktop*.

**PRINTERS** *Ventura Publisher* runs with any PostScript-compatible printer or typesetter, including Apple's LaserWriter or LaserWriter Plus. It also runs on Epson's MX-, FX-, or RX-80, Hewlett-Packard's Laserjet or Laserjet Plus, IBM's Proprinter, Xerox's 4020 Color Ink Jet Printer or 4045 Laser Printer, and Tall Tree Systems' J Laser printer card and compatible printers.

*Ventura* makes it easy to choose between different types of printers. You can print to one printer for a draft, using the width tables of some final output device, and line breaks will be accurately reflected. For example, you could print to an HP Laserjet for a draft version, using the PostScript width tables, and send final output to a Linotronic typesetting machine.

**NEW STANDARD** *Ventura Publisher* introduces a new bottom-line standard for page composition packages on the IBM. Besides being easy to use and compatible with a wide range of word processing and graphics files, it offers a lot of the functionality previously available from only high-end WYSIWYG systems or code-based typesetting programs.

*Ventura's* ability to download fonts to the Laserjet and Xerox printers bring these machines more into league with the LaserWriter—good news for those who were worried that they would have to upgrade their laser printers when they became desktop publishers. The link between the *Ventura Publisher* document and the text and graphics files that compose it will appeal to those who like to continue extensive editing after the page composition step—a luxury that few could afford when pages were typeset, graphics were inked, and pages were pasted up by hand.

With full functionality in all three WYSIWYG page views, style sheets, automatic section/figure/footnote numbering, automatic indexing, automatic hyphenation, kerning, decimal leading, widow/orphan line controls, and more, *Ventura Publisher* is a bargain.

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olution. A .31mm dot pitch for high character definition. And a text mode that lets you switch from color

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For sophisticated graphics, the Quimax PX-22 high resolution monitor is the smart choice. EGA compatible, it features 64-color graphics. A .31mm dot

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PX-32



PX-22



PX-IV



DM-1400



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*Desktop publishing on the PC must match,  
and, we hope, surpass, the standards set by  
PageMaker on the Macintosh. This special  
section of output samples lets you be the  
judge of PC-based page composition software.*

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# STACKING UP TO THE MAC

WYSIWYG page composition software has made desktop publishing accessible to the average PC user. However, the quality of the screen display is not the ultimate test of a program's worth: the goal of desktop publishing is to produce a printed product.

We created a four-page newsletter for this project called "Bylines." It's the corporate newsletter of a fictitious company—B.M.I., (Better Management, Inc.). The newsletter's design specifications test a program's ability to perform in a real-life production environment.

The newsletter mixes one-, two-, and three-column formats; jumps text between pages; wraps copy around art; and incorporates graphics ranging from a 1-2-3 .PIC file to a bit-mapped halftone.

The text for each article throughout the

newsletter was formatted in *Microsoft Word*. *PageMaker* on the Macintosh retains all character formats (typeface, size, and style), as well as paragraph formats (leading, indentation, tabs, and alignment). Fonts used include:

- Helvetica: 24-point bold italic, 18-point bold italic, 18-point italic, 10-point book, 10-point italic, 10-point bold italic, 9-point book, 9-point bold, 9-point italic.
- Times: 127-point, 14-point italic, 12-point book, 10-point book, 10-point bold, 10-point italic, 7-point italic.

The following samples show you the output from *PageMaker* on the Macintosh. *PFS:ClickArt Personal Publisher*, *FrontPage*, *Harvard Professional Publisher*, and *Ventura Publisher* as printed out on an Apple LaserWriter.

## PAGEMAKER ON THE MACINTOSH

1. The graphic logo was created in MacDraw.

2. The title Bylines was hand-kerned in MacDraw in 48-point Times (MacDraw's largest size), then placed in PageMaker and stretched to fit the design specifications. Stretched characters from MacDraw are still smoothed according to the built-in PostScript formulas for each character. PageMaker on the Macintosh does not have a kerning feature.


3. There is no automatic hyphenation in PageMaker on the Macintosh. After placing the text in columns, we inserted "discretionary hyphens" on some lines—that is, hyphens that are displayed only when they fall at the end of a line. As a result, some lines are very loose (see the first paragraph in the second story).

4. A master page for odd-numbered pages was formatted with two columns; to create uneven column widths at the top of the page, the column edge was dragged to the right. This same column setting is used again on page 3.

5. In order to wrap text around the graphic, the text in column one was broken into two blocks, and the width of the second block was changed by dragging the right column edge to the left and reflowing the text in that area.

6. The drawing of the building was scanned as line art using the Microtek scanner and saved in the MacPaint format. Once placed in PageMaker, it was scaled down and a hairline border was added using PageMaker's tools.

7. The initial drop cap at the beginning of the second article was created by changing the column guides on different blocks of text to wrap them around the letter T, which was inserted as a separate object.



# Bylines

Better Management, Inc.

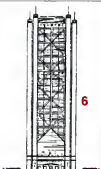
## Ground-Breaking for New Headquarters Announced

It was all pomp and fanfare at the groundbreaking ceremonies for BMI's new corporate headquarters, held last Wednesday at the site on which the 27-story building will rise.

In attendance was BMI's entire Board of Directors, including Chairman Stephen W. Olsen, as well as a contingent of local dignitaries headed by the Mayor of Minneapolis and his wife. A cheering crowd of 1000 looked on, and all BMI employees were given the day off so that they could attend.

"This is an important day in the history of our company," Olsen said after he turned over a symbolic pile of dirt with a gold-plated spade. "Our spectacular growth has been making headlines for years. Now we will have a home that represents the status we have achieved in the management consulting industry."

After presenting Olsen with a key to the city, the Mayor commented, "As the leader of this great city, nothing is more exciting for me than to see another beautiful skyscraper thrust upward to signify to the world that Minneapolis is as dynamic and vibrant as ever."



BMI's new world headquarters

## A Message from Our President

This is an exciting time in the history of our company. I hope all of you enjoyed the groundbreaking ceremonies for our new headquarters. When the building is finished, it will be something to behold.

But the business of business continues, and I would like to address a concern that has been mentioned to me by several employees in recent months: the role of BMI in South Africa.

As many of you know, BMI has operated a South African office out of Durban since 1976. Ten years later, the situation in South Africa has deteriorated to such a state that every corporation that does business in that troubled country is being forced to evaluate what its next move should be.

Let me emphasize that BMI does no business with the government of South Africa. All of our sales are to private corporations. This does not mean, of course, that we feel no obligation to do what we can to help ameliorate the tragic

(continued on Page 4)

(continued on Page 3)

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8. The header and footer on pages 2 and 4 were entered on the master page for even-numbered pages, including automatic page-numbering and the shaded bars. The page was formatted into three columns on the master page for even-numbered pages.

9. After the text was placed in each column at the top half of the page, the type was vertically justified by dragging the bottom of each text block up or down to make the columns even. Then the format was changed to two columns before the bottom half of the page was placed.

10. The article at the bottom of the page was broken into seven different blocks of text, and column guides were changed and text reflowed in order to give each block a different width.

11. We used a clip-art image for a map. We scaled it in PageMaker and dropped a hairline border around it, using PageMaker's tools.

## Comings & Goings This Month

Sales Representatives Mary Orta and Jeff Norris are off to the Munich office to bolster BMI's German operation. Timothy Smith and Susan Kastner will be adding their talents to the London team.

The New York office welcomes Leah Crestara, David Frederick, and Gordon Potter. Caroline Westert has started at the San Francisco office as an accountant.

Here in Minneapolis, there are several promotions to report. Susan McBurney and Kevin Joyce have been named Regional Managers, and Stephen Roberts has become Director of Publications, replacing Joseph Litvak, who is retiring this month after 22 years with the company.

Our new Public Relations Assistant is Elizabeth Wilson, and the Marketing Department welcomes three new employees: Montgomery Lewis, D.P. Stratton, and Michael Moore, all of whom are Minnesota natives.

Joseph Ryan is off to Tokyo to begin his second two year stint as a Marketing Assistant. He is recently joined by Ed Roch from New York City, and Joe Musker, a native of Boston.

John Turner has been promoted to the post of Assistant Director of Computer Operations, and two employees in his department are retiring this month: Kurt Mack, a 20-year veteran, and Richard Zellars, who has been with BMI for 16 years.

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## Events At BMI

### January 5

Monthly general meeting. Topic: The Benefits of BMI's New Health Insurance Plan. Speaker: Marlene Schwartz, Benefits Coordinator. 12:30 p.m., cafeteria, Main office.

### January 8

Haiku Yoga with Kate, 6 p.m., conference room B

### January 16

BMI Book Discussion Group meets, 12:30 p.m., main conference room, Main office. Book: The Bears of Egypt, Maine (Carolyn Shute).

### January 24

Managers' retreat weekend begins. Buses will arrive at the Green St. entrance 3 p.m. (Note: If you're not sure if you should attend, check with your supervisor.)

## New Office to Open in Budapest

When BMI launched phase two of its ambitious international expansion program, no one would have guessed that one of its most successful foreign offices would be found behind the Iron Curtain.

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"It's crazy, we know, but the Hungarians can't get enough of Western-style management training techniques!" enthused Martha Smithson, director of BMI's 22-person Budapest office.

"I've worked for BMI in o'fices all over Western Europe," Smithson said. "In Paris, London, Rome, and Zurich what

you have is steady but strong sales of management training packages. In those offices, the forecasters can predict to one percentage point the amount of growth to expect.

"Here in Budapest, our first six months were frighteningly slow, but the second six have been astonishing. Our computer sometimes doesn't even believe the numbers we're feeding it!" Sales

representative Joe Mitchell has been with BMI Budapest for nine months. "I think what we saw was a reluctance on the part of the Socialist establishment to embrace so-called 'capitalist' techniques for management training and implementation.

Smithson adds, "I know the folks back in Minnesota are pleased with our progress here, and I have a feeling it won't be long before they ask us to have a look at Rumania, Czechoslovakia, maybe even Poland. Here in Hungary we're really more established than we thought we would be."



BMI European Offices

## PAGEMAKER ON THE MACINTOSH

12. The text was wrapped around the portrait and the initial drop cap by dividing the text into eight different blocks and changing the width of each section. We accomplished this by adjusting the column guide and reflowing the text in short blocks.

13. The bar chart was created in Excel. It had to be copied into MacDraw or copied into the Clipboard or Scrapbook in order to become accessible to PageMaker—you can place .PIC and bit-mapped graphics directly in PageMaker only on the Macintosh.

14. The tabs for the table were set in Microsoft Word.

### Employee of the Month

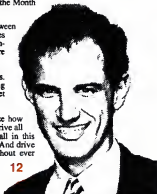
Nicholas Kinnard was more than a little humble when he found out that he had been selected as the BMI Employee of the Month Award winner. "All I do is drive," he said.

Actually, Nicholas is one of the most important links between BMI's scattered Minneapolis offices. Every day he drives a company van from office to office, transporting employees, packages, letters, and messages and making sure everything and everyone gets to the right place.

Nicholas, 23, has been with BMI for almost two years. He started out at the central mail room, but when a driving position became available, he leapt at the chance to get outdoors.

"I've lived in Minneapolis all my life, but now I realize how little of it I had seen until I got in the van and started to drive all the time," he says. "Snow, rain, hail, ice, you see it all in this town, but I don't let it bother me. I just keep driving." And drive he does, sometimes 200 miles a day and more, without ever missing a stop on his rounds.

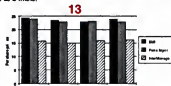
Like all employees of the month, Nicholas will receive three days paid vacation.



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### This Month on Wall Street...

Over the last month BMI's price-per-share stock value has risen along with the Dow Jones Industrial Average. The stock's performance is by no means stellar, but according to BMI's Stephen Laffey, it is "blue-chip" solid and destined to produce consistent advances no matter what the vagaries of the market are as a whole.



	BMI, Inc.	Petra Mgmt	InterManagement
Week 1	24.5	24	15.75
Week 2	23.5	23	15
Week 3	23	23.25	16
Week 4	24	23	16.25

(Continued from Page 1)  
situation that exists. But should we just close the office, cut our losses, and leave?

Those who oppose this kind of complete withdrawal make what I think is a convincing argument. They say that once a company leaves, it has virtually no chance to have any positive impact on the situation. BMI has several black South African employees in the Durban office, and we feel we owe them, as well as their white counterparts, the same kind of loyalty that all our employees get.

So for the time being we will not be closing the Durban office, but let me assure you that the Board of Directors will continue to monitor events closely.

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15. The graphic logos were placed from the same file used on page 1 but scaled to different sizes here.

Page 4

Festive music was provided during the ceremony by the Edina High School Marching Band under the direction of Michael Lindstrom. Local circus performers also entertained, and a picnic lunch was provided for company employees. Blue skies and a warm breeze kept the party alive well into the afternoon.

One BMI Plaza seems destined to become as famous as BMI itself, because the new building will be revolutionary in many ways. The design, by Dennis Wedlick of R.G. Nystrom Associates of Chicago, echoes the Pompidou Center in Paris and the new headquarters of Lloyd's of London. Most of the building's pipes, ducts, and elevators will be installed on the outside of the structure, allowing large open spaces inside.

A seven story atrium with cascading waterfalls and a lake will take advantage of this unusual plan because, as Chairman Olsen said at Wednesday's ceremony, "We want our employees to work in a beautiful and comfortable environment."

Building services will include three cafeterias, a health club with a rooftop running track available to all employees, and an in-house travel agency. One BMI Plaza will also be what is currently known as a "smart building." Computers will manage all the climate control functions; and every floor will be wired for extensive inter-office computer communication.

Bergman foresees no potential glitches in the construction schedule. Work will continue at

full speed through the cold winter months, and the grand opening should take place in the fall of 1988. Bergman commented, "The ground-breaking was certainly exciting, but wait until you see the ribbon-cutting ceremony!"



15 Better Management, Inc.

**Better Bylines** published fortnightly by Better Management, Inc.

Donald Wilmon, writer  
Barry Owen and Lisa Kleinman, editors  
Diane Burns and S. Venil, art directors



Better Management, Inc.  
5000 Better Way  
Minneapolis, MN 08009

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Bulk Rate  
Permit 005  
Minn, MN

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## PFS:CLICKART PERSONAL PUBLISHER

1. The name of the newsletter is a bit-mapped graphic rather than true 127-point Times (as the original design specified)—we could not create text larger than a 48-point laser font.

2. The borders that surround the top banner and appear at the bottom of the page are open rectangles—no fill patterns are available in PFS:ClickArt Personal Publisher.

3. We could not adjust leading between lines to be smaller than shown here—which is more than that called for in the design specifications. As a result, all of the articles ran longer than the space provided on the layout.

4. All graphics here and on other pages are bit-mapped images; PFS:ClickArt Personal Publisher does not support the draw-type files and 1-2-3 .PIC file called for in the original design.

5. The automatic PictureWrap feature was used to wrap text around the graphic here.

6. Vertical rules on all pages are of 1-point width—hairlines are not available.

7. The "continued on Page x" text is 7-point Helvetica, and the footer is 9-point Helvetica; italic was not available in these sizes. This text printed as a bit-mapped font when typed directly into PFS:ClickArt Personal Publisher as a separate block; we had to make it part of the body copy in the columns in order to get a true PostScript font.

8. The header and footer had to be created (or copied/pasted) individually on each page; PFS:ClickArt Personal Publisher does not have automatic page-numbering or master-page elements.



Better Management, Inc.

# Bylines

## Ground-Breaking for New Headquarters Announced

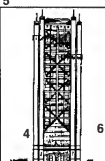
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In attendance was BMI's entire Board of Directors, including Chairman Stephen W. Olsen, as well as a contingent of local dignitaries headed by the Mayor of Minneapolis and his wife. A cheering crowd of 1000 looked on, and all BMI employees were given the day off so that they could attend.

"This is an important day in the history of our company," Olsen said after he turned over a symbolic pile of dirt with a gold-plated spade. "Our spectacular growth has been making headlines for years. Now we will have a consolidated home that represents the status we have achieved in the management consulting industry."

After presenting Olsen with a key to the city of Minneapolis, the

Mayor commented, "As the  
(continued on Page 5)



## A Message from Our President

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But the business of business continues, and I would like to address a concern that has been mentioned to me by several employees in recent months: the role of BMI in South Africa.

As many of you know, BMI has operated a South African office out of Durban since 1976. Ten years later, the situation in South Africa has deteriorated to such a state that every corporation that does business in that troubled country is being forced to evaluate what its

(continued on Page 7)

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9. The design of the second page of our test newsletter is not well suited to PFS:ClickArt Personal Publisher's abilities. ClickArt insists that this be a three-column page and that the text fill one column completely before flowing on to the next column. The result: incredibly complicated cutting, pasting, and baseline changes were required in order to stock three columns of text above a two-column article.

10. Scanned images lose gray tones when printed at 75 dots per inch—higher resolution is not available for graphics in PFS:ClickArt Personal Publisher, regardless of the printer's capabilities.

11. Text wrap around the graphic on page 3 of the newsletter was achieved by adjusting the length of the baseline for each line of text along the edge of the portrait. This was a relatively simple and convenient procedure.

12. The bar chart on page 3 is a bit-mapped graphic; the text of chart labels is illegible in such small sizes.

13. The table of figures uses spaces and a monospaced Courier font to achieve columnar alignment—tabs are not available in PFS:ClickArt Personal Publisher.

14. The bit-mapped logo that appears on page 4 of the newsletter loses resolution when reduced. Note the text in the logo is illegible.

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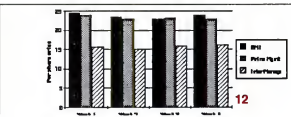
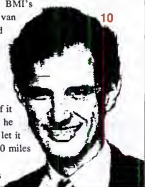
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Better Management  
5000 Better Way  
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## Comings & Goings this Month

Sales Representatives Mary Givis and Jeff Naeve are off to the Munich office to bolster BMI's German operation. Timothy Smith and Susan Kuntzler will be adding their talents to the London team.

The New York office welcomed Leah Creators, David Frederick, and Gordon Foster. Caroline Westcott has started at the San Francisco office as an accountant.

Here in Minneapolis, there are several promotions in vigor. Susan McIlwain and Kevin Joyce have been named Regional Managers, and Stephen Roberts has become Director of Publications, replacing Joseph Lifrak, who is retiring this month after 22 years with the company.

Our new Public Relations Assistant

is Elizabeth Wilton, and the Marketing Department welcomes three new employees: Montgomery Lewis, D.P. Stratos, and Michael Moore, all of whom are Minnesota natives.

Joseph Ryan is off to Tokyo to begin his second year stint as a Marketing Assistant. He is monthly joined by Ed Roth from New York City, and Joe Mueker, a move of Boston.

John Turner has been promoted to the post of Assistant Director of Computer Operations, and two employees in his department are retiring: the month Earl Mack, a 20 year veteran, and Richard Zeltner, who has been with BMI for 16 years.

## Events At BMI

**Monday, January 5**  
Monthly general meeting Topic: The Benefits of BMI's New Health Insurance Plan. Speaker: Marlene Schwartz, Benefits Coordinator. 12:30 p.m., cafeteria, Main office.

**Tuesday, January 6**  
Hatch Toga with Kani. 6 p.m., conference room 1.

**Wednesday, January 7**  
BMI Real Discussion Group meets. 12:30 p.m., main conference room, Main office. Topic: The Basics of Export Sales (Carolyn Shaw).

**Thursday, January 8**  
Manager's retreat weekend begins. Retreat will occur at the Green St. entrance to the Main Office at 3 p.m. (Note: If you're not sure if you are on our staff if you are scheduled to attend, check with your supervisor.)

## New Office to Open in Budapest

When BMI launched phase two of its worldwide international expansion program, no one would have guessed that one of its most successful foreign offices

would be found behind the Iron Curtain.

"It's easy, we know, but

the Hungarian can't get

enough of Western-style

management training

techniques," enthused

Noriko Smithson,

director of BMI's

22-person Budapest

office.

"I've worked for BMI in offices all over Western Europe,"

Smithson said. "In Paris, London, Rome, and Zurich what

you have to study how strong sales of management training

packages. In those offices, the foreigners can predict to one percentage point the amount of growth in export.



Here in Budapest, our first six months were highly successful, but the second six have been disappointing. Our computer resources don't even

believe the numbers

we're feeding it!"

Sales representative

Joe Mitchell has been

with BMI Budapest

for nine months. "I

think what we saw

was a reluctance on

the part of the

Soviet

establishment to

introduce so-called "capitalist" techniques for

management training and implementation.

Smithson adds, "I know the folks back in Minnesota

are pleased with our progress here, and I have a feeling

it won't be long before they ask us to have a look at

Romania, Czechoslovakia, maybe even Poland."

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## FRONTPAGE

1. The Bylines logo was created using Freelance, then sized and manipulated using the FrontPage toolbox.

2. The text for the main banner on page 1 was typed directly into FrontPage, using 127-point Times as specified in the design.

3. FrontPage does not include automatic page-numbering or automatic headers or footers.

4. FrontPage does not support bit-mapped or paint-type images. Instead, on page 1 we designated an area for art to be manually pasted in. FrontPage allows you to select fill patterns from a menu of 34 options.

5. When we finally printed out our newsletter, the Times text on page 1 printed out as Helvetica. The correct typeface is shown here, but it took hours of research and technical help from the FrontPage support staff to figure out the problem. The program reserves certain type callouts for its own use and does not allow these callouts to be used in a style sheet: boldface and italic, for example. Although you are allowed to embed these codes in text (see the sample on page 2), if you inadvertently include them on a style sheet they cause random formatting errors.



Better Management

# Bylines

## Ground-Breaking for New Headquarters Announced

*It was all pomp and fanfare at the groundbreaking ceremonies for BMI's new corporate headquarters, held last Wednesday at the site on which the 27-story building will rise.*

*In attendance was BMI's entire Board of Directors, including Chairman Stephen W. Olsen, as well as a contingent of local dignitaries headed by the Mayor of Minneapolis and his wife. A cheering crowd of 1000 looked on, and all BMI employees were given the day off so that they could attend.*

"This is an important day in the history of our company," Olsen said after he turned over a symbolic pile of dirt with a gold-plated spade. "Our spectacular growth has been making headlines for years. Now we will have a home that represents the status we have achieved in the management consulting industry."

After presenting Olsen with a key to the city, the Mayor commented, "As the leader of this great city, nothing is more exciting for me than to see another beautiful skyscraper thrust upward to signify to the world that Minneapolis is as dynamic and vibrant as ever."

4

Insert Photo Here

## A Message from Our President

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But the business of business continues, and I would like to address a concern that has been mentioned to me by several employees in recent months: the role of BMI in South Africa.

As many of you know, BMI has operated a South African office out of Durban since 1976. Ten years later, the situation in South Africa has deteriorated to such a state that every corporation that does business in that troubled country is being forced to evaluate its next move.

Let me emphasize that BMI does no business with the government of South Africa. All of our sales are to private corporations. This does not mean, of course, that we feel no obligation to do what we can to help mollify the tragic situation that exists. But should we just close the office, cut our losses, and leave?

Those who oppose this kind of complete withdrawal make what I think is a convincing argument. They say that once a company leaves, it has virtually no chance to have any positive

*continued on page 3*

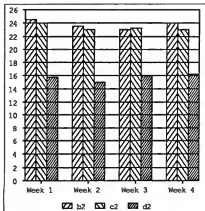
6. In order to switch the names that appear in "Comings & Goings" to boldface, a callout had to be inserted before each name, and a second callout inserted after each name to switch back to roman text. This process would be extremely tedious on a long document.

7. The text wrap around the map on page 2 (which doesn't appear because FrontPage will not accept bit-mapped images) was created by dividing the space into six element blocks (seven if you include the title), connecting the blocks, and flowing the text. FrontPage automatically jumps the text from one block to the next.

8. The bar chart on page 3 of the newsletter was pulled in directly from a 1-2-3 .PIC file.

9. The BMI logo here is a direct import from Freelance, without any further manipulation in FrontPage. Notice how the logo has been elongated.

8



Sales Representatives Mary Ortiz and Jeff Norris are off to the Munich office to bolster BMI's German operation. Timothy Smith and Susan Kastner will be adding their talents to the London team.

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John Turner has been the post of Assistant Director Computer Operations, and employees in his department.

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## HARVARD PROFESSIONAL PUBLISHER

1. We left space for the logo and banner to be pasted in because Harvard Professional Publisher does not work with draw-type packages and does not offer point sizes above 72.

2. Bit-mapped scans and paint images—called for on pages 1, 2, and 3 of our newsletter—will be supported by Harvard Professional Publisher, but, in the prerelease version we were working with, the conversion program for these types of files was not yet implemented. However, the text wrap around the areas designated for graphic images was on automatic result of Harvard Professional Publisher's Mask feature.

3. The gray bars that are part of the header/footer designs were drawn in the page-style file. The style files also included the text of the headers and footers and automatic page-numbering.

4. Harvard Professional Publisher forces columns of equal width across a page. However, we accomplished the layout of the text on page 1 by modifying the tags to extend text across more than one column.

5. Harvard Professional Publisher could set the "continued on page x" text in 6- or 8-point size, but not the 7-point size called for by the design.

1

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This is an important day in the history of our company. Olsen said after he turned over a symbolic pile of dirt with a gold-plated spade. Our spectacular growth has been making headlines for years. Now we will have a consolidated home that represents the status we have achieved in the management consulting industry. After presenting Olsen with a key to the city of Minneapolis, the Mayor commented, RAs the leader of this great city, nothing is more exciting for me than to see another beautiful skyscraper thrust upward to signify to the world that Minneapolis is as

(continued on page 4)

2

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(continued on page 2)

5

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6. The boldface and italic type in the two articles at the top of the page took forever to specify through the slow editing process. This process could have been shortened if we had made these specifications in the word processing file, saved it in DCA format, and then run a conversion of the text file.

7. Admittedly this page represents a very difficult design: three-column makeup over two-column makeup. Because Harvard Professional Publisher forces every page to have the same number of columns, we had to specify six columns (the maximum possible) in order to produce this page. Paragraphs at the top of the page were set up to extend across two columns each (that is, a third of the page width); paragraphs at the bottom of the page were set up to extend across three columns each (half the page width).

8. The flow of text (three-column makeup over two-column makeup) on this page required that we skip columns (by flowing into columns 1, 3, and 5 at the top of the page, for example). This resulted in automatic "continued . . ." messages at the bottom of each column. We turned this automatic feature off, and therefore we were forced to enter the "continued . . ." lines manually throughout all four pages of the document.

9. Harvard Professional Publisher does not support tabs. We could not create a table by using a monospace font (as we did with PFS:ClickArt Personal Publisher) because we were already using two other typefaces—the limit allowed for one document.

7

Page 2

## Comings & Goings 6

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 BMI Book Discussion Group meets, 12:30 p.m., main conference room, Main office. Book: The Boats of Egypt, Maine (Carolyn Stuart).

**January 24**  
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Smithson adds, "I know the folks back in Minnesota are pleased with our progress here, and I have a feeling it won't be long before they ask us to have a look at Rumania, Czechoslovakia, maybe even Poland.

Here in Hungary we're really more established than we thought we would be."

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## PAGEMAKER

1. The logo for our newsletter was created in Windows Draw!; PageMaker's tools were then used to resize the logo and place it here and on page 4.

2. The Bylines banner was typed directly into PageMaker in 127-point Times.

3. Text placed from Microsoft Word retained the formatting set up for paragraph alignment, size, and style. The final release is supposed to retain typeface as well, but this was not implemented in our prerelease version.

4. PageMaker will be able to import and manipulate scanned images in the final release version. The results from our prerelease version of PageMaker were unacceptable, and so pages 1, 2, and 3 of our newsletter show blank spaces where graphics were planned.

5. Text wrap around graphics is created by dividing text into separate blocks and changing the width of each block.

6. The text wrap around the large initial cap at the top of the third column was a bit tricky to set up: we had to break the article heading and first paragraph into four different blocks of text, and we worked in 200 percent view to align the drop cap with the first two lines of text.

7. The running headers and footers, including gray bars, were entered on master pages. PageMaker will support automatic page-numbering in the final release, but this feature was not implemented in our version.



# Bylines<sup>2</sup>

## Ground-Breaking for New Headquarters Announced

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(Continued on Page 4)

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(Continued on Page 2)

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	BMI, Inc	Petra Mgmt	InterManage
Week 1	24.5	24	15.75
Week 2	23.5	23	15
Week 3	23	23.25	16
Week 4	24	23	16.25

10

8. The complex layout of the second page of our newsletter was handled easily by PageMaker. The boldface and italic words in the article at the top of the page were preserved as formatted in Microsoft Word. We built the top part of the page by setting up a three-column page layout and then flowing the text into each column. We adjusted the length of the three columns by dragging the bottom of each block to lengthen or shorten it. (There is no automatic vertical justification.)

9. After building the top part of the page, we used a menu command to change to a two-column format. The text of the article at the bottom of the page was broken into seven parts in order to accommodate the wide title and to wrap text around the graphic. The edge of each text block was dragged to change its width; the text adjusted automatically and did not have to be reflowed. (This last feature is one of the improvements over the Macintosh version.)

10. The tab position settings for the table on page 3 were carried over exactly as set in Microsoft Word, but they could have been set or changed in PageMaker.

11. The logo on page 4 was picked up from the same Windows Draw file as the logo on page 1 and then scaled down in PageMaker.



Better Management, Inc  
5000 Better Way  
Minneapolis, MN 09009

11

8

Page

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9

## VENTURA PUBLISHER

1. The logo and the large font for the banner text were created by stretching copy pulled in from a GEM Draw file. Letters were hand-kerned in GEM Draw.

2. "Continued on Page 4" was typed in a separate frame at the bottom of column one, and similar text was typed at the bottom of the third column. This text could be 6 or 8 points, but not 7 points as originally specified for this design. Italic is not an option in these small point sizes.

3. Text wrap around the graphic here (and on other pages) is automatic.

4. Text wrap around the large initial cap at the top of the third column is automatic and is set up as part of paragraph formatting.

5. The text of the headers and footers was entered through a menu command, including automatic page-numbering. The gray bars that appear in headers and footers were drawn in the "underlying page" frame, for automatic inclusion on all pages.



# Bylines

## Ground-Breaking for New Headquarters Announced

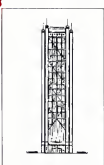
It was all pomp and fanfare at the groundbreaking ceremonies for BMI's new corporate headquarters, held last Wednesday at the site on which the 27-story building will rise.

In attendance was BMI's entire Board of Directors, including Chairman Stephen W. Olsen, as well as a contingent of local dignitaries headed by the Mayor of Minneapolis and his wife. A cheering crowd of 1000 looked on, and all BMI employees were given the day off so that they could attend.

"This is an important day in the history of our company," Olsen said after he turned over a symbolic pile of dirt with a gold-plated spade. "Our spectacular growth has been making headlines for years. Now we will have a home that represents the status we have achieved in the management consulting industry."

After presenting Olsen with a key to the city, the Mayor commented, "As the leader of this great city, nothing is more exciting for me than to see another beautiful skyscraper

(Continued on Page 4)



## A Message from Our President

This is an exciting time in the history of our company. I hope all of you enjoyed the groundbreaking ceremonies for our new headquarters. When the building is finished, it will be something to behold.

But the business of business continues, and I would like to address a concern that has been mentioned to me by several employees in recent months: the role of BMI in South Africa.

As many of you know, BMI has operated a South African office out of Durban since 1976. Ten years later, the situation in South Africa has deteriorated to such a state that every corporation that does business in that troubled country is being forced to evaluate what its next move should be.

Let me emphasize that BMI does no business with the government of South Africa. All of our sales are to private corporations. This does not mean, of course, that we feel no obligation to do what we can to help mollify the tragic situation that exists. But should

2 (Continued on Page 1)

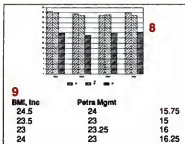
6. This complex layout was handled easily by Ventura Publisher, including automatic text wrap around the graphic at the bottom of the page.

7. Since it was available, the automatic text-wrap feature was used on page 3, rather than forcing hard carriage returns at the end of each line or breaking the text into many blocks of different widths to wrap text closer to the scanned image.

8. The bar chart was pulled in directly from 1-2-3.

9. Tab position settings for the table were not carried over from the word processing program, but they could be set in Ventura Publisher as part of the Tag definition. Column heads with center tabs required different Tags than those heads set up for the other rows with decimal tabs.

10. The rule box around the text for the bulk-rate postage permit was a menu option. The logo on page 4 of the newsletter was picked up from the same file as the logo on page 1 and then scaled down in Ventura Publisher.



little humble when he found out that he had been selected Award winner. "All I do is drive," he said.

important  
Miss  
a computer  
messages  
everyone

almost  
mail  
became  
get out-

life, but  
them until  
all the  
you see  
a bother  
he  
and more,  
ends.



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Page 2

## Comings & Goings

Sales Representatives Mary Grels and Jeff Norris are off to the Munich office to bolster BMI's German operation. Timothy Smith and Susan Kauter will be adding their talents to the London team.

The New York office welcomes Leah Crestani, David Frederick, and Gordon Potter. Caroline Westcott has started in the San Francisco office to an accompaniment.

Here in Minneapolis, there are several promotions to report. Susan McIlwain and Kevin Joyce have been named Regional Managers, and Stephen Babers has become Director of Publications, replacing Joseph Litvak, who is retiring this month after 22 years with the company.

Our new Public Relations Assistant is Elizabeth Wilson, and the Marketing Department welcomes three new employees: Montgomery Lewis, D.P. Sorjonen, and Michael Mowat, all of whom are Minnesotans.

Joseph Ryan is off to Tokyo to begin his second year as a Marketing Assistant. He is recently joined by Ed Kwik from New York City, and Jon Munkner, a native of Boston.

John Turner has been promoted to the post of Assistant Director of Computer Operations, and two employees in his department are retiring this month: Karl Mack, a 23 year veteran, and Richard Zehner, who has been with BMI for 16 years.

## Events At BMI

**January 5**  
Monthly general meeting. Topic: The Benefits of BMI's New Health Insurance Plan. Speaker: Marlene Schreiner. Benefactor Coordinator 12:30 p.m., cafeteria. Main office.

**January 8**  
Ribbon Tying with Kim, 6 p.m., conference room B.

**January 16**  
BMI Board Discussion Group meeting, 12:30 p.m., main conference room, Main office. Book: *The Best of Everything* (Candace Stone).

**January 24**  
Management retreat weekend begins. Retreat will arrive at the Green St. entrance to the Main Office at 7 p.m.

until you see the ribbon-cutting ceremony!"



Better Management, Inc.

**Better Bylines** published fortnightly by Better Management, Inc. Donald Wilcott, writer Barry Owen and Lisa Kleinman, editors Diane Burns and S. Venit, art directors

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Bulk Rate  
Permit 005  
Minn, MN

## New Office to Open in Budapest

When BMI launched phase two of its ambitious international expansion program, no one would have guessed that one of its most successful foreign offices would be founded behind the Iron Curtain.

"It's crazy, we know, but the Hungarians can't get enough of Western-style management training techniques," enthused Martha Smithson, director of BMI's 22-person Budapest office.

"I've worked for BMI in offices all over Western Europe," Smithson said. "In Paris, London, Rome, and Zurich what you have is steady but strong sales of management training packages. In those offices, the forecasters can predict to one percentage point the amount of growth to expect."

"Here in Budapest, our first six months were frighteningly slow, but the second six have been astonishing. Our computer sometimes doesn't even believe the numbers we're feeding it!" Sales representative Joe Mitchell has been with BMI Budapest for nine months. "I think what

we saw was a reluctance on the part of the Socialists' establishment to embrace so-called "capitalist" techniques for management training and implementation.

Smithson adds, "I know the folks back in Minnesota are pleased with our progress for nine months. I think what they ask us to have a look at Rumania, Czechoslovakia, maybe even Poland. Here in Hungary we're really more established than we thought we would be."



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*A look at Superpage II gives you a feeling for  
the road desktop publishing is going to be  
traveling. Straddling the line between  
professional typesetting and desktop publishing,  
Superpage II is a program to set your sights  
on and save your dollars for.*

---

## Bestinfo's Superpage II

# BEYOND DESKTOP PUBLISHING

One of the first things that hits you when you take a look at Bestinfo's *Superpage II* is its price: a permanent license for the product costs \$7,000. Indeed, Bestinfo would be the first to tell you that *Superpage II* is not in the desktop publishing market; it is a professional typesetting tool designed for use by magazine and newspaper publishers with high standards and heavy deadlines. In its market, *Superpage II* is considered a bargain compared with other typesetting front ends.

What makes *Superpage II* worth seven grand, especially when its little brother, *Harvard Professional Publisher* (see review in this issue), offers many of the same features and is being marketed by Software Publishing for one-tenth the price?

Briefly, the answer is speed, precision, and flexibility. We explore these three features in detail here to illustrate some of the significant differences between "desktop publishing" systems and the high-end pro-

fessional typesetting systems they attempt to emulate.

We reviewed an early version of *Superpage* about a year ago, when it was one of the first WYSIWYG typesetting front ends in its price range (see "Special Report: Page Design on the PC Screen," *PC Magazine*, Volume 4 Number 25, page 204). The program was a bit ahead of its time in the sense that few professional typesetting shops had PCs and few PC owners were

interested in doing their own typesetting.

Breaking into a market in which most typesetters were hard-wired into brand loyalty, *Superpage* helped pioneer the trend toward lower-priced PC-based typesetting front ends that could drive a wide range of typesetters. Although it had some limitations that put it at the low end of professional typesetting systems, its price made it appealing to typesetting shops that wanted to add a terminal to their existing typesetting system. Since then, the release of *Superpage II* has eliminated some of the complaints about the speed and flexibility of earlier versions.

At the same time, *Superpage* was ahead of the current surge in interest in typesetting that has been brought on by the recent breakthrough in laser printing technology and by the release of many low-end page composition products for the PC. These new developments have lured corporate publishing departments toward the idea of bringing the typesetting function in-house. The high price of products like *Superpage* can be quickly offset by the savings in outside typesetting fees. The same thing was true 2 years ago, of course, but then the market wasn't primed for such products.

### WHAT'S THE DIFFERENCE?

*Superpage II* straddles the line between desktop publishing and professional typesetting. It drives over 25 laser printers and typesetters from a dozen different manufacturers, including Allied, Autologic, Compugraphic, ITEK, Varityper, Hewlett-Packard, QMS, Xerox, Tegra, and any device that supports PostScript. This makes it a plausible investment for any shop that already has one of these devices, as well as for corporate publishing departments that want to go partway at first—investing in professional software for their PCs but using outside services for final output. In contrast, most of the desktop publishing products reviewed in this issue support only a few laser printers and PostScript typesetters.

Corresponding to the wide range of output devices, *Superpage II* can handle a wide range of fonts, with no limit to the number of fonts per page. You can import text files up to 16 megabytes in size—much larger than any low-end desktop publishing documents—with up to 60,000

characters per page and up to 999 pages per document.

You can create up to 80 different formats per format file, specifying font sizes from .5 point to 127 points in half-point increments. Positive and negative leading can be specified in half-point increments as well.

The program enables you to set up an unlimited number of kerning pairs and to change the default settings for spacing between words and letters. And you can define up to 40 columns per page, with user-editable automatic "continued to" and "from" messages.

*Superpage II* uses a 20,000-word hyphenation dictionary, user-expandable to 50,000 words, with logic formula hyphenation for words not found in the dictionary. (The hyphenation dictionary also happens to be available in Spanish and Norwegian.) You can regulate the number of consecutive lines that end with hyphens.

Justification speed is 2,000 to 3,000 characters per second—nearly double the earlier version's speed. You can specify automatic vertical justification, with options for adjusting leading between lines, paragraphs, or user-specified points. *Superpage II* offers interactive pagination (including control of widows and orphans) at a claimed rate of one page per second. You can output in pages or in galleys.

If this sounds like a litany of miraculous features, you need to know that most typesetting front ends usually incorporate these features—with higher speed and greater precision than does *Superpage II*. Products that are considered "better" by typesetting professionals, however, are correspondingly much more expensive, are not PC compatible, and are likely to support fewer output devices.

By comparison with any desktop publishing package, *Superpage* offers more features, more precision, and more control by the user over the final appearance of the page. These features make *Superpage* appealing to professional publishers who put out newspapers or magazines regularly.

**LEARNING TO BE FRIENDLY** Even though *Superpage* was one of the first WYSIWYG typesetting systems for the PC, it was still basically code-based: you had to make all character and paragraph

## ■ *Superpage II* adds a friendly front end of interactive pop-up menus and context-sensitive help screens.

formatting specification in code in the text (rather than directly on the WYSIWYG editing screen), and the hierarchical menus offered few prompts or reminders.

*Superpage II* adds a friendly front end of interactive pop-up menus and comprehensive context-sensitive help screens. You can edit text directly in WYSIWYG mode if you prefer that to working with codes, making it much easier for beginners to use than its predecessor. It is still primarily a code-based system, however, and it requires a much longer learning curve to reach competence with page layout than does any desktop publishing package. The package price includes a 2-day training class for one operator.

Though it may seem complicated to the average desktop publisher, *Superpage II* is much easier to work with than its non-WYSIWYG competition. The layout


screen displays the document in views that can zoom between five different views of the screen, and these views can be customized to show from 10 to 200 percent views of the actual size. The program displays text on the screen in a representative screen font that accurately reflects the relative size and position of the characters (the width of the letters is adjusted to match the width table for the specified font).

Bestinfo opted for this generic font to keep screen-redraw time down. You can edit individual characters to create special characters beyond the basic set of 128.

*Superpage II* shows graphics accurately in actual-size view, and you can size and move them after they have been placed. Rulers are displayed in inch measures at the right and the bottom of the layout screen, with a 1-inch grid pattern over the whole page or screen display that shows tick marks at 1-pica intervals. Commands are executed using pop-up menus that are listed along the bottom of the screen.

**TEXTUAL CONSIDERATIONS** As in *Harvard Professional Publisher*, characters are formatted by preceding selected text with a tag such as "<heading1>" or "<bodytext>"—names of eight characters or less enclosed in pointed brackets (or some other user-specified delimiter). These format specifications can be entered by clicking the mouse on menued selections in edit mode, but most users deal with such a large volume of text that all coding is done at the word processing stage. You can use Bestinfo's word processing package, *Typedit*, or convert ASCII text files created in other word processing programs. Otherwise, all text formatting and editing is done in the edit mode window; you cannot make changes to the text directly on the layout screen.

A format specification includes the typeface, type size, leading (spacing between lines), and paragraph alignment (such as left, centered, justified), plus degrees of kerning between letters. You can also set up a format specification to create a ruled line above a paragraph or to create an initial drop cap at the beginning of the paragraph. If you make changes to the format specifications after text is flowed onto a page, you need to reflow the text to convert it to the new specifications.

**FACT FILE**

**Superpage II**  
Bestinfo Inc.  
Rosetree Corporate Center  
1400 N. Providence Rd., #117  
Media, PA 19063  
(215) 891-6500  
List Price: \$7,000  
Requires: 640K RAM, one floppy disk drive,  
hard disk recommended, DOS 2.0 or later.  
In Short: A heavy-duty typesetting tool that  
drives a wide range of typesetters and brings  
professional typesetting within reach of the PC.  
Requires a higher level of skill to operate, but  
gives the user more control over the final  
appearance of the printed page. Copy  
protected.  
CIRCLE #72 ON READER SERVICE CARD

## ■ PAGE COMPOSITION

### DEFAULT VALUES II for DEMO

Vertical justification may add as much as: (in points)

- Between lines	:	0
- Between paragraphs	:	0
- Above subheads	:	0
Widow/orphan ctrl. y/n	:	No
Default col. measure	:	14
Font 1 (default)	:	TIMES
Font 2	:	TIMESITL
Font 3	:	TIMESBLD
Font 4	:	TIMBLDIT
Font 5	:	HELV
Font 6	:	HELVBLD
Font 7	:	HELVOB
Font 8	:	HELVBLD
Maximum page depth (picas)	:	78
Default left page style	:	DEFLT
Default right page style	:	DEFLT

If all values are OK, hit Esc  
Move to desired row with arrow keys  
Select item to change with +

Suprpage II menus aim for tight control of text formatting. Here, you are allowed to specify different leading formats for text lines between paragraphs and above subheads. Although the page-layout portion of Suprpage II is WYSIWYG and more, the no-nonsense look of this formatting menu indicates that Suprpage II addresses a different audience than the other products reviewed in this issue—professional publishing companies.

Each different character/paragraph format used in a document must have a format defined for it in the format file. This "style-sheet" feature makes *Suprpage* well suited for producing a series of documents that use the same format, such as issues of a newspaper or magazine. You can open a new document and load the same format file you used in other documents. You can also change the type specifications by loading a different type spec file for a document, but the text must be reflowed.

Bestinfo also offers a program called *Typeset* (priced at \$2,700) that will hyphenate and justify text and display it on the screen in galley for proofing before the text is flowed into page layouts and merged with graphics in *Suprpage*.

### THE MATTER OF GRAPHICS

*Suprpage* has built-in graphics tools for drawing lines and rectangles. You can select any width for ruled lines and borders and select from 11 different fill patterns, or "tints" (percentage of screen from 0 to 100 in 10 percent increments). To change a fill pattern or line width once you've

drawn a graphic object, you need to delete the graphic and redraw it. You can reverse text to print as white lettering on a dark background.

You can pull in graphics from other programs, including *PC Paintbrush*, *Windows Paint*, and *GEM Paint*, as well as scanned images from *Datacopy*. Graphics can be moved or scaled on the page.

**LAYING OUT THE PAGES** Before starting a document, you must define one or more page layouts through the main menu's Page Styles command. Page style definition includes the number of columns, up to three lines of text for the header and footer, and graphic elements.

Each page style is saved as a file and can be used in any number of documents. A single document can have any number of different page styles. You run the text through the hyphenation/justification program before flowing it onto a page.

You have two options in flowing a long text file into a document: flow into selected (sequential) columns on the current page, or flow to every page. Once text is flowed, you can define areas for graphics and re-

## ■ The "style-sheet"

feature makes *Suprpage* well suited for producing a series of documents that use the same format.

flow the text; alternatively, you can place the graphics first and flow the text afterward. In either case, you can mask off areas of pages to force text to wrap around these areas.

Besides wrapping text around rectangular masks, you can actually define amorphous "runaround" areas to shape text around nonrectangular graphics. You can control the automatic entry of the "Continued on page x . . ." message that is added to the bottom of a column when you jump the text onto another page.

**GETTING GOING** *Suprpage II* will run on a 640K-byte IBM XT or AT with at least 10 megabytes of free space on a hard disk. It requires a Hercules graphics card and monochrome monitor. A mouse is optional but recommended.

The package comes on 9 disks; the program is installed automatically in about 15 minutes using the installation program provided.

**IN A LAN ENVIRONMENT** *Suprpage II* will run in Novell NetWare LAN (local area network) environments. Besides being able to distribute the cost of the program over a number of stations, this feature can be a special advantage in shops where the functions of text entry, editing, typographical coding, and final page composition are distributed among different departments or personnel.

A fully networked system with *Suprpage*, *Typedit*, and *Typeset* includes a job tracking system that maintains a "job ticket" on each "file folder" and produces customized management reports.

# The Common Dilemma

## Apparent Solution.



**512KB, 6Mhz.  
\$4545\***

The **Common Dilemma** for you, the microcomputer buyer is deciding which system to purchase to meet the needs of your users, your customers, or yourself.

The **Apparent Solution** seems to be that you could buy IBM®. What you'd get however, is a naked machine with inadequate performance at an astronomical price.

Or, you could be enticed by those super-cheap and questionable clones at the expense of sacrificing full compatibility, quality, reliability, and user satisfaction.

The **Intelligent Conclusion** is, of course, to move up to **Proteus™**. **Proteus™** solves the dilemma with three high quality American-Designed, Engineered and American-Built powerful microcomputers. **Proteus™ Microcomputers**, which come from a leading electronics corporation, surpass all microcomputers on the market, in technology, speed, reliability, price and after-sale support.

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- ✓ O Memory Wait State
- ✓ 360K 5¼" Floppy Drive
- ✓ 2 Serial Ports, 2 Parallel Ports
- ✓ Clocks/Calendar, SASI Interface on Board
- ✓ Reset Button
- ✓ 135 Watt UL Power Supply
- ✓ Hercules Compatible Mono/Graphics Adapter
- ✓ High Resolution Monochrome Monitor

**List Price: \$979.**

## Intelligent Conclusion.



**1MB, 12.5Mhz.  
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- ✓ Combination Hard/Floppy Disk Controller
- ✓ 1 MB RAM Expandable to 4MB on Motherboard
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- ✓ 3 Serial Ports, Selectable RS232 or RS422
- ✓ 2 Parallel Ports
- ✓ Clock/Calendar with Battery on Board
- ✓ A.T. Keyboard
- ✓ Reset Button
- ✓ 200 Watt UL Power Supply — 110v/220v Switching

**List Price: \$2195.**

The **Proteus-286GT™**, Our Standard Configuration

- Same as 286 but with
- ✓ Intel 80286-12 CPU, 6/12.5 Mhz
- ✓ One Memory Wait State

**List Price: \$2549.**

**proteus**  
The Intelligent Conclusion



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### CRITICS AND USERS AGREE



"World Class Winner"—PC World readership, October 1986.

"TurboTax is fast to learn, fast to use, fast to print your return!"—*Alt. Seymour, syndicated columnist, March 1986.*

"TurboTax takes the prize for most forms—our favorites for this review were TurboTax."—*InfoWorld, March 1986.*

"Flexible, Affordable and Complete"—PC Magazine, April 1985. "It makes doing your taxes almost fun!"—*Bill Alvares, PC Magazine, April 1985.*

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4225 4562 4564 4797 4952 4972 6251 6252  
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### ■ PAGE COMPOSITION

**A CLASS APART** Obviously, *Superpage II* is in a class apart from the other page composition products reviewed in this issue. Corporate publishers need to evaluate their needs carefully before opting for one of the low-end packages, especially if high volume and fast turnaround are important issues. Potential users must also be prepared to pay higher hourly rates for the levels of skill required to work with this system compared to the skill required to use the simpler packages.

Harvard Professional Publisher users will have a tremendous advantage: if they move up to *Superpage*, they will be able to convert their files to *Superpage* format and output them to a wide range of typesetters.

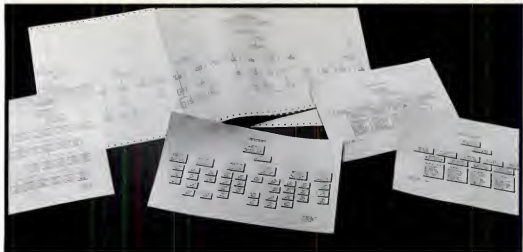
### ■ Products like

Bestinfo's *Superpage* set the goals for low-end page composition products.

This kind of upward compatibility will make it all the more inviting for corporate publishers to try bringing part of the typesetting function in-house. And at least one typesetting shop is using *Superpage* to offer its clients network hook-up to a main typesetter. This sort of "service bureau" function is likely to increase significantly over the next few years.

*Superpage* remains in the forefront of the trend toward simpler implementations and lower pricing in the typesetting market—good news for typesetters and corporate publishing departments that do a lot of typesetting. For the rest of us, products like Bestinfo's *Superpage* set the goals for low-end page composition products. ☐

Diane Burns and S. Venit are owners of TechArt San Francisco, a graphic design and production shop that uses Macintoshes and IBM PCs to produce brochures, newsletters, and books for a variety of corporate clients. They are frequent contributors to PC Magazine.



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Org Plus automatically draws and spaces the boxes, centers the text, and precisely lays out the connecting lines. The chart is so exact you can use it in any situation, no matter how formal.

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## Rave reviews

"The charts are perfectly laid out and attractive."

—Glenn Hart,  
*PC Magazine* 2/25/86

"The program is so simple to use that you'll find little use for either the manual or the on-line help screens."—Henry F. Beechhold, *Computer Consultant* 6/86

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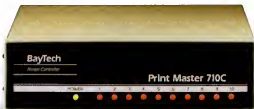
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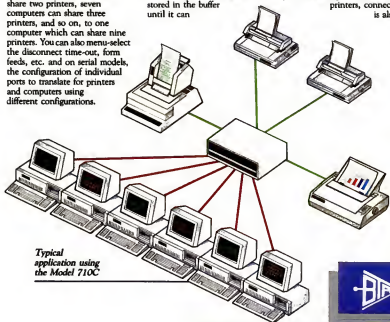
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*Comparing the best-known page description languages for the PC is like comparing a just-ripe apple with a budding orange: PostScript implementations and hardware have been available for many months, while those for Interpress and DDL are mostly future promises. Here's the current report on the state of PDL art.*

---

# PUTTING TEXT AND GRAPHICS IN THEIR PLACE

**D**riving many of the new generation of desktop printers with simple character codes and dot-by-dot graphics makes about as much sense as programming a PC in the pure 1s and 0s of machine language. It's possible, but to make full use of the power of these machines and to cut program development time, you're far better off turning to a higher-level language.

Of all the available higher-level ways to send data to a printer—page description languages, text-formatting languages, graphics interfaces, and hard-wired printing routines—page description languages (PDLs) are perhaps the most intriguing. PDLs are one of the major components of desktop publishing (for a look at the others, see Stewart Alsop's introduc-

## ■ PAGE DESCRIPTION LANGUAGES

tion to this issue's cover story, "Desktop Publishing Without Hype").

Essentially, PDLs enable an output application to tell a printer how to construct a page from a combination of text, fonts, and graphics. They let the computer system specify complete page images as a series of procedures and parameters rather than by indicating every single inked area. A set of routines in the printer or its controller then translates those instructions into the marks that will actually be placed onto the paper.

Like higher-level computing languages, PDLs increase the portability of applications, cut storage and communications costs by making encoded routines more compact, and let people who are writing programs concentrate on larger design issues rather than on the minute details of the hardware.

Adobe Systems' PostScript, Xerox Computer Services' Interpress, and Imagen's DDL are the best-known PDLs and the ones most likely to have the greatest impact on the personal computer industry in the next few years. PostScript, Interpress, and DDL also share certain similarities: they are all descendants of work done on printer languages at Xerox's Palo Alto Research Center (PARC).

All three of these early leaders use a stack-oriented postfix notation (in which parameters are maintained in an expandable list rather than in fixed memory locations, and the operator comes after the parameters it acts on, such as in "3 4 add" producing 7).

As in other kinds of text processing (and also artificial intelligence work), a stack-oriented approach has the added advantage of adapting well to documents and files of very diverse sizes and of allowing intricate layering of subroutines calling further subroutines. While it's true that most people find the stack approach a little confusing at times, it's well suited to fast processing of this kind of heterogeneous, composite task.

All three of these PDLs, at least so far, are also implemented as interpreters rather than as compilers. Thus each time a file is to be printed, the page description is translated anew into the actual series of dots to be laid down on the paper. That keeps the input files and translators smaller, but it

does sometimes lead to situations in which imaging a document can take many minutes per page.

**THEY'RE INDIRECT** As useful as PDLs are, most of us won't ever directly write or see a single line of them. PDL instructions are normally created by applications programs and sent to printers without direct intervention by users.

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■ Like higher-level computing languages, PDLs increase the portability of applications and cut storage and communications costs.

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From the applications point of view, the output process is similar to printing on an idealized device that understands high-level constructs. The electronic hookup, the connection protocols, and the actual flow of data are the same as with a less intelligent printing method, but the content is a series of PDL commands and data.

From the printer end, the physical process is again similar to the more traditional command and character output approach. But with a PDL, the arriving information is treated as data inputs to the PDL interpreter program, and quite a bit of processing may take place before the printer ever starts to print anything on the page.

This approach is in sharp contrast with the way more-traditional applications describe images. They normally handle page formatting by sending sequences of forward or backward movement and forward and reverse line-feeds. They send graphics as strings of binary values representing dot positions to ink in or skip in a succession of lines across the page.

PDL instructions can be quite detailed, but they are still much more efficient than sending the location of every inked spot on

the page image. Among the instructions PDLs typically provide are ones to select fonts, determine the position of elements, draw lines and curves, show text, and fill areas with patterns or colors.

In addition to graphics commands, many PDLs include a full range of standard computational and control instructions. These languages are not meant for general-purpose computing, but they can be told to calculate many of the necessary page design parameters. You can, for example, tell a PDL that instead of printing everything full size, you want all horizontal dimensions shrunk by 32.4 percent and all vertical dimensions shrunk by 38 percent.

**PDL BENEFITS** PDLs usually cut communications requirements since it generally takes far fewer bits to send descriptions of most graphics objects to the printer than it does to send the actual positions of every spot in the image (scanned images and paint program pictures can be exceptions).

Much like the advantages of other high-level computer languages for general computer programming, the biggest advantage PDLs have to offer is device independence. In theory, a correctly formulated PDL file can be sent to any printer or other output device that accepts the language, and the device will provide the best output of which it is capable.

On the software end, this means that you can run a program and in some cases even produce a stored output print file for later use without deciding exactly what printer you'll be using. You can route the same output to any printer speaking the proper PDL. It should also mean that an application run now will produce print output commands that should still be valid as many as 5 years in the future.

Using a PDL also means if office-printer quality and resolution aren't sufficient for a particular application, you can take that same PDL file and send it to a more suitable, higher-resolution device like a typesetting machine.

PDLs also offer another important benefit. With the PDL approach, you don't need a driver routine for every possible permutation of software and printer hardware. Because the PDL functions as a common logical interface, both the pro-



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## ■ PAGE DESCRIPTION LANGUAGES



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Artwork West End Film Inc. <b>Autumn</b> Zenographics <b>Brushwork</b> West End Film Inc. <b>Cherbrook</b> West End Film Inc. <b>ChemBase</b> Molecular Design Ltd.	<b>GEM Draw</b> <b>GEM Paint</b> <b>GEM Graph</b> <b>GEM WordChart</b> Digital Research Inc. <b>Harvard Presentation</b> Graphics Software Publishing Corp. <b>Microsoft Chart</b> Microsoft Corp.	<b>Mirage</b> Zenographics <b>PC-Slide</b> Management Graphics Inc. <b>PresenterPC</b> DICOMED Corp. <b>Quantum Graphics</b> Threshold Software <b>35mm Express</b> BPS	<b>Windows Draw</b> Micrografx Inc. <b>Cricket Graph</b> Cricket Software <b>Inset</b> American Programmers Guild <b>Perspective</b> Three D Graphics <b>Windows Graph</b> Micrografx Inc.	
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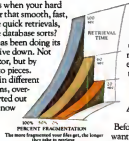
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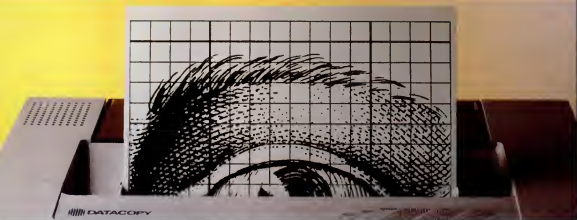
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## ■ PAGE DESCRIPTION LANGUAGES

gram and the output device need only link up to that single set of operations. One driver can thus run a wide variety of printers.

**PRACTICAL LIMITS** Given present printing technologies, PDLs make sense for use with only laser and other xerographic printers or electronic typesetters, which print graphics as a series of tiny dots rather than the fully formed characters produced by daisy wheel printers (because the formed characters can't be scaled up and down in size and are too hard to combine to form any possible requested shape).

The initial PDL implementations have all been on laser printers or other similar buffered page printers—in other words, on printers that store an electronic image of the page in memory but that must print a complete image of the page once they begin printing any part of the page. There's no reason why the same approach couldn't be used for ink jet or impact dot matrix printers, providing that they were equipped with sufficient processing power or that the translation was done before sending the data to the printer.

It also seems that all current PDL printer implementations are buffered page printers, which store an electronic image of the page in memory but which must print a complete image of the page once they begin printing any part of the page.

**REAL CHOICES** Until recently, choosing a page description language was academic for PC users because the only implementation of a major language was Adobe's PostScript. And the only piece of hardware that it drove was Apple Computer's LaserWriter printer.

The situation is suddenly changing. Several of the applications environments, such as *Microsoft Windows* and *GEM*, have added PDL support, and most of the new desktop publishing programs and many graphics and CAD applications are doing so as well.

Furthermore, while the actual interpreter programs that handle the translation of PDL statements to printable dots are proprietary products, the major languages themselves have been placed in the public domain. Alternative interpreter programs for several of the better-received PDLs should be out in the next several months.

**WHICH PDL?** With several PDLs rapidly gathering momentum, it's hard for a software developer or printer manufacturer to know which one to support. Many applications packages may support two or more PDLs, just the way they now support multiple printers operating in native mode. Companies like Microsoft, which has already added a PostScript driver for *Windows*, say they'll support any PDL for

### ■ PostScript allows the printer to relieve the central CPU of much of the detail involved in creating an image.

which there is a sufficient demand.

Although maintaining multiple PDLs might vitiate much of the reason for using a PDL, none of the three top contenders has or is likely to have a sufficient advantage to wipe out the others. Several more-specialized and less-prevalent approaches may be around for quite a while.

Any of the leading packages and several of the others will do the job, given software that outputs the PDL and printers that accept the resulting files. The choice then becomes a matter of selecting the PDL that will handle the greatest number of applications programs you're using. For developers and strategic planners, the choice is more difficult. Here's how the three best-known PDLs stack up.

**POSTSCRIPT** Adobe's PostScript is the most mature of the three PDLs. Its early implementation on the Apple LaserWriter has allowed Adobe to collect feedback and refine the product.

PostScript's biggest strength is its completeness. Not only does it have an extensive set of graphics operators but it has enough general computing power to calculate many of its needed parameters. You could even write programs that accept files intended for another output format.

PostScript's sophistication also allows

the printer and the controller to relieve the central CPU of much of the detail involved in creating a printable image. That attribute will become increasingly important as more and more users turn to multi-processing or multiuser software and have less unused computer power available for supervising output.

Fonts in PostScript are represented in outline form and can be treated like other graphics. This feature also allows a single font image to be scaled to any chosen size, thus saving the space needed to keep characters of each size on hand.

PostScript's command files are expressed in printable ASCII form. That makes programs easier to read and debug, and it ensures that PostScript-encoded routines can be sent over any communications link that can handle ordinary text.

PostScript lacks an explicit provision for dealing with overall document structure, printer environment, and multiple users or multiple file destinations. Adobe has developed a recommended set of document structure conventions that can be encoded in the form of PostScript comment lines, but that's a weak method of dealing with the problem.

While PostScript is criticized for being slow (sometimes taking as much as a half an hour to print a complex page on the Apple LaserWriter), it is currently the only system that allows you to print a page on a laser printer at 300 dots per inch or to take your disk down to a copy shop with the right typesetter (Allied Linotronic 100 or 300) and print the same document at 1,200 or 2,400 dpi. (*PC Magazine* is printed with type that's about 1,200 dpi.) Neither Interpress nor DDL gives you access to these choices for printing a document.

**INTERPRESS** Xerox's Interpress, in contrast to PostScript, is slightly more limited in its imaging and calculating abilities, but it has far better support for document routing and control. Through the definition of a header structure and explicit divisions between pages, Interpress facilitates printing in page-order-sensitive applications, such as when duplexing (two-sided printing) and when printing signatures.

According to Xerox's marketing literature, keeping Interpress's calculating ability more modest was a design trade-off to

# Peruse our pano

- ✓ denotes IBM-AT compatibility.  
 \* denotes IBM-PCjr compatibility.  
 CP—copy-protected, NCP—not copy-protected

## SOFTWARE

We only carry the latest versions of products.  
 Version numbers in our ads are current at press time.

<b>Alpha Software ... NCP</b>	
• Keyworks 2.0	\$49
• Alpha/Three 1.0	223
<b>Application Technique</b>	
• Pizazz 1.0 (NCP)	35
<b>Ashton-Tate ... NCP</b>	
• dBase III Plus 1.1	call
• Framework II 1.1	call
• Sign-Master 5.1 (CP)	157
• Diagram-Master 5.01 (CP)	207
• Chart-Master 6.2 (CP)	237
• Map-Master 1.0 (CP)	245
• MultiMate 3.31	call
• MultiMate Advantage 3.6	call
<b>Best Programs ... NCP</b>	
• PC/Tax Out (1987 version for 1986 taxes)	49
<b>Bible Research ... NCP</b>	
• THE WORD 3.1 (KJV Bible)	159
• THE WORD 3.1 (NIV Bible)	159
<b>Borland International ... NCP</b>	
• Turbo Tutor 2.0	24
• Turbo Database Toolbox 2.0	41
• Turbo Graphix Toolbox 1.0	41
• Turbo Editor Toolbox 1.0	41
• Turbo Lightning 1.0	59
• Word Wizard 1.0	41
• Turbo Pascal 3 w/WBCD & 8087 support	59
• Turbo Pascal 3 w/Turbo Tutor	75
• Turbo Prolog 1.1	59
• Turbo Family Jumbo Pack	187
• Sidekick 1.5	51
• Traveling Sidekick 1.0	43
• Traveling Sidekick w/Sidekick	73
• Reflex 1.1	87
• Reflex Workshop 1.0	41
• Superkey 1.1	41
<b>BPI Accounting ... NCP</b>	
• General Accounting C 13	299
<b>Breakthrough ... NCP</b>	
• Timeline 2.0	239
<b>Broderbund ... CP</b>	
• Print Shop	35
• Print Shop Companion	33
• Graphics Library 1	22
• Graphics Library 2	22
<b>Chipsoft ... NCP</b>	
• Turbo Tax 4.0 (1987 version for 1986 taxes)	45
<b>Computer Associates ... NCP</b>	
• SuperCalc 4 1.0	279
<b>Consumers Software ... NCP</b>	
• Spreadsheet Auditor 3.0 (check your work)	89
<b>Dec Software ... NCP</b>	
• Dec Easy Port	19

## PC Connection Software Special

through February 28, 1987

### LOTUS DEVELOPMENT CORP. ... NCP -HAL

Do you have a problem communicating with 1-2-3? Don't feel bad, now HAL is here to lend a hand. HAL understands English, so you are both now speaking the same language. Tell him to "enter Jan to Dec across in C3," and voila! The months appear across the top like magic. HAL is the greatest thing to happen to 1-2-3 since the personal computer.

- RAM-resident, so it's always right there when you need it
- Compatible with Lotus 1-2-3 Release 1A or 2.0
- Includes the ability to link spreadsheets (finally!)
- Undo feature lets you change your mind

For the IBM PC, XT, or AT  
 (requires 1-2-3 Rel. 1A or 2) ... \$109.

• Dec Easy Mate	26
• Dec Easy Payroll	32
• Dec Easy Accounting	45
<b>Executive Systems ... NCP</b>	
• XTREE 2.0	37
• Hot 3.0 (DOS utility)	41
<b>5th Generation ... NCP</b>	
• Feedback 5.13	97
<b>Funk Software ... NCP</b>	
• Sideways 3.11	39
<b>Generic Software ... NCP</b>	
• Generic CAID 2.0	69
<b>Harvard Associates ... NCP</b>	
• PC LOGO 2.0	89
<b>Infocom ... NCP</b>	
• Cornerstone 5.2	59
<b>Lifetree ... NCP</b>	
• Volkswriter Deluxe Plus 1.0	69
• Volkswriter 3 1.0	147
<b>Micro Education (MECA) ... CP</b>	
• Managing Your Money 3.0	115
• Managing the Market 1.0	85
<b>Micropro ... NCP</b>	
• WordStar 3.31	179
• WordStar Prolog 3.31	259
• WordStar 2000 Plus Release 2	285
<b>Microfilm ... NCP</b>	
• R-base 5000 1.01	call
• R-base System V 1.0	359
<b>Microsoft ... NCP</b>	
• Windows 1.03	65
• Multiplan 2.01	119

• Microsoft Chart 2.02	\$197
• Microsoft Word 3.1	279
• Microsoft Project 3.0	239
<b>LANGUAGES</b>	
• Quick Basic 2.0	59
• Macro Assembler 4.0	97
• Pascal Compiler 3.3	175
• Fortran Compiler 3.31	229
• C Compiler 4.0	279
<b>Microstuf ... NCP</b>	
• Crosstalk XVI 3.61	95
• Remote 1.3	95
<b>Migent Software ... NCP</b>	
• Ability 1.0A	65
<b>Monogram ... NCP</b>	
• Dollars & Sense 2.0	105
<b>Nutshell Software ... NCP</b>	
• Clipper (Autumn '86)	349
<b>Noio Press ... NCP</b>	
• WinWriter 1.0	35
<b>Paperback Software ... CP</b>	
• VP-Planner 1.3	57
• VP-Info 1.0	57
<b>Personics ... NCP</b>	
• SmartNotes 1.4	49
<b>Peter Norton ... NCP</b>	
• Norton Commander 1.0	36
• Norton Utilities 3.1	59
<b>Quarterdeck ... NCP</b>	
• DESQview 1.3	65
<b>Simon &amp; Schuster ... NCP</b>	
• Webster's New World Speller 1.3	39
• Webster's New World Thesaurus 1.0	43
• Webster's New World Writer 1.01 (includes Thesaurus & Speller)	109
<b>Softlogic Solutions ... CP</b>	
• Double DOS 4.0 (PC concurrency)	33
• Software Carousel 2.0	33
• Disk Optimizer 2.0	35
<b>Software Publishing ... NCP</b>	
• PFS First Choice 1.0	97
• Personal Publisher 1.0	109
• Professional Write 1.0	119
• Professional File 1.0	149
• Harvard Presentation Graphics A-01	245
• Harvard Total Project Manager 1.12	289
<b>Springboard ... CP</b>	
• Certificate Maker	34
• Newsroom	35
• Clip Art Volume 1 (for Newsroom)	19
• Clip Art Volume 2 (for Newsroom)	25
• Newsroom+Pro (not copy-protected)	79
<b>Symantec ... NCP</b>	
• Q & A 2.0	call
<b>True BASIC, Inc. ... NCP</b>	
• True BASIC 2.0	109
• True BASIC Libraries	each 32
<b>Turner Hall ... NCP</b>	
• SQZ 1.5 (for Lotus compactness)	49
• Note-It 2.0 (notes on spreadsheets)	49
<b>WordPerfect Corp. ... NCP</b>	
• WordPerfect Library	59
• WordPerfect 4.2	239

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## TRAINING

<b>ATI ... CP</b>		
* <b>SKILL BUILDER PROGRAMS</b>		
PC-DOS	MS-DOS	DOS-REF
IBM-PC	BASIC	... each \$33
* <b>TRAINING POWER PROGRAMS</b>		
Lotus 1-2-3	Wordperfect	dBase III Plus
WordStar	Displaywrite 3	each 43.
<b>Individual Software ... CP</b>		
* The Instructor II		26
* Professor DOS		33.
* Tutorial Set (both items above)		49.
* Typing Instructor II		26
* Training for Lotus 1-2-3 (for vers. 1A & 2)		37.
<b>Microsoft ... NCP</b>		
* Learning DOS (for any version)		33.
<b>Simon &amp; Schuster ... NCP</b>		
* Typing Tutor III 1.5		33

## EDUCATIONAL

All educational programs listed are copy-protected except where noted.

<b>Barron's</b>	
• Computer SAT	35.
<b>Designware</b> (reqs. CGA)	
• Spellchecker (ages 6 to adult)	22.
<b>Edware</b> (reqs. CGA)	
• Algebra 1, 2, 3, or 4	22.
<b>Harcourt Brace Jovanovich</b>	
• Computer SAT	49
<b>Stone &amp; Associates</b> (reqs. CGA)	
• My Letters, Numbers, Words (ages 7 to 5)	27.
• Kids Stuff (ages 3 to 8)	27.
<b>True BASIC, Inc. ... NCP</b>	
• Calculus	32
• PreCalculus	32

## RECREATIONAL

All recreational programs listed are copy-protected except where noted.

<b>Blue Chip</b>		
* Managing for Success (American Dream) ...	36	
* Millionaire	36	
<b>Electronic Arts ... NCP</b>		
* Starflight (requires CGA)	32	
<b>Hayden Software</b>		
* Sargon III (highest rated Chess program) ...	32	
<b>* Infocom ... NCP</b>		
Enchanter	The Witness	Planetfall
Leather Goddesses	Hitchhiker's Guide	
Moonmist	Zork I	each 24
Zork II	Zork III	each 27
Invisicles (hint booklets). Specify game ... 6.		
<b>* Microleague Sports (reqs. CGA)</b>		
		25.
<b>Microprose (reqs. CGA)</b>		
* F-15 Strike Eagle		22
* Silent Service		22

## PC Connection Hardware Special

through February 28, 1987

### HERCULES COMPUTER

#### TECHNOLOGY, INC. ... 2 years

##### Graphics Card Plus

Monochrome is great. You get fantastic resolution, no flicker, and all the green you could ever hope for. And, for you 1-2-3 lovers, the original Hercules Graphics Card was the answer to a prayer. Now Hercules has come out with a great new invention, aptly named the Graphics Card Plus. Not only does it do all the good old stuff, but it also does some nifty new stuff too...

- RamFont mode allows you to define up to 3072 standard characters (instead of 256)
- Works at the speed of monochrome, with the flexibility of graphics
- Text and graphics can be shown on screen at the same time
- Speeds up graphics based word-processors (like Microsoft Word, Framework II, and Symphony)

For the IBM-PC, XT, & AT ... \$special price

#### Microsoft (reqs. graphics brd.)

- Flight Simulator 2.12 32. |

#### Mindscape (reqs. graphics brd.)

- Balance of Power (avoid nuclear war) 30. |

#### 1Step Software (reqs. CGA)

- Golf's Best (Pinehurst or St. Andrew's) 19 |

#### Parlor Software

- Bridge Parlor (best Bridge simulation) 49 |

#### Sierra On-Line (reqs. CGA)

- Space Quest 32. |

- King's Quest II 33 |

- King's Quest III 33. |

#### Simon & Schuster

- Star Trek/Kobayashi 27 |

#### Spectrum HoloByte (reqs. CGA)

- Orbiter (Shuttle simulation) 27. |

- GATO 27 |

#### Sublogic (reqs. graphics brd.)

- Jet 33. |

#### XOR ... NCP

- NFL Challenge (be the coach) 79 |

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330M

## HARDWARE

Manufacturer's minimum limited warranty period is listed after each company name. Some products in their line may have longer warranty periods.

### AST Research ... 2 years

All boards listed (except Piggyback) include a FREE copy of DESView

SixPakPlus 64k C/S/P	\$169.
SixPakPlus 384k C/S/P (fully populated)	209
SixPakPremium 256k C/S/P	
(upgrades to 1 Mb or 2 Mb w/Piggyback)	319
SixPakPremium Piggyback Board 256k	189.
• Advantage Premium 512k S/P	
(upgrades to 1 Mb or 2 Mb w/Piggyback)	469
• Advantage Premium Piggyback 512k	289.
RAMpage! 256k (upgrades to 2Mb)	call
RAMpage! AT 512k (upgrades to 2Mb)	call
• RAMpage EGA 512k	699

AST Premium series boards and RAMpage! boards support EMS and fully support EEMS.

### Amdtek ... 2 years

- Video 310A mono monitor (amber) 159. |

- Color 722 - EGA compatible 519. |

### Computable ... lifetime

- 9-to-25 Pin Serial Converter cable 19 |- Smartmodem-to-AT cable (9 feet) 19. |- 15-foot Parallel Printer cable 27. |- 2-Position (AB switch box) 39. |- 3-Position (ABC switch box) 65. |

### Cuesta ... 1 year

- Datasaver 400 Watt (backup power unit) call |

### Curtis ... lifetime

#### ACCESSORIES

- Printer Stand 18. |

- Universal System Stand 25. |

#### CABLES

- Smartmodem-to-PC Cable (9 feet) 17. |

- Keyboard Extension Cable (3 to 9 feet) 27. |

- Extension Cables for IBM Mono Display 33 |

- Printer-to-IBM cable (9 feet) 17. |

#### SURGE SUPPRESSORS

- Safestop (6 outlets) 21. |

- Diamond (6 outlets) 29. |

- Diamond Plus (w/FAX & modem protection) 41 |

- Emerald (6 outlets; 6 ft cord) 36. |

- Sapphire (3 outlets; EMVRFI filtered) 47. |

- Ruby (6 outlets; EMVRFI filtered; 6 ft cord) 55. |

- Ruby-Plus (w/FAX & modem protection) 65. |

- Command Center SPECIAL 79. |

### DCA ... 1 year

- Irma (3270 emulation board) 729 |

### Epson ... 1 year

- EX-800 printer (80 col., 300 cps) 499. |

- EX-1000 printer (136 col., 300 cps) 569. |

- FX-85 printer (80 col., 180 cps) 379. |

- LX-86 printer (80 col., 120 cps) 249. |

- LQ-800 printer (80 col., 180 cps) 549. |

- LQ-1000 printer (136 col., 180 cps) 759. |

- LQ-2500 printer (136 col., 324 cps) 1069. |

- Printer-to-IBM cable (6 feet) 15. |

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## Everex ... 1 year

Everex II 1200 Baud Internal modem ... \$137.

## 5th Generation ... 6 months

Logical Connection Print Buffer 256k ... call

## Hayes ... 2 years

Smartmodem 1200 ... 389

Smartmodem 1200B (w/Smartcom II) ... 349.

Smartmodem 1200B (no software) ... 319.

Smartmodem 2400 ... 589.

Smartmodem 2400B (w/Smartcom II) ... 529.

Smartcom II 2.1 (software) ... 89.

## Hercules ... 2 years

Hercules Color Card ... 159.

Hercules Graphics Card ... 189.

Hercules Graphics Card Plus ... special

## Intel ... 5 years

Above Board PC 64k (upgrades to 2 Meg.) ... call

Above Board AT 128k (upgrades to 2 Meg.) ... call

Above Board PS-PC 64k C/S/P ... call

Above Board PS-AT 128k S/P ... call

Inboard 386/AT ... call

8087 (for IBM-PC & XT) ... 119.

8087-2 (for 8 MHz PC compatibles) ... 169.

8087-8 (for IBM-PC AT & XT 286) ... 195.

8087-8 (for 8 MHz AT compatibles) ... 269.

## Kensington Microwares ... 1 year

Masterpiece ... 94.

## key tronic ... 90 days

511 keyboard (desktop) ... 169.

## Kraft ... 1 year

Joystick Adapter Card ... 29.

New! 3 Button Joystick ... 33.

## Microsoft ... 1 year

Microsoft Bus Mouse 6.0 ... 127.

Microsoft Serial Mouse 6.0 ... 135.

## Mouse Systems ... lifetime

PC Mouse with PC Pant+ ... 127.

Bus Mouse with PC Pant+ ... 127.

## NEC ... 2 years

Multisync monitor (EGA compatible) ... 589.

## NSI Logic ... 3 years

Smart EGA ... 299.

## Orchid Technologies ... 1 to 2 years

Tiny Turbo 286 ... 445.

PC Turbo 286 w/1 Meg ... 739.

Turbo EGA ... 589.

## Princeton Graphics ... 1 year

MAX-12E Amber monochrome monitor ... 179.

HX-12 RGB monitor (690 x 240) ... 449.

## Quadrant ... 1 to 2 years

Expanded Quadboard C/S/P ... 129.

0k (upgrades to 384k) ... 179.

384k (fully populated) ... 159.

Microfazer Printer buffer 64k (parallel) ... 249.

Microfazer II Printer buffer 64k ... 349.

## QuakeGA ... half-card

SMA ... 30-day money-back guarantee

PC-Document Keyboard Templates ... 12.

DOS/Basic 3.0-3.1 WordStar ... 12.

Lotus 1-2-3 WordStar 2000 ... 12.

Symbol MultiMate ... 12.

dBBase III WordPerfect ... 12.

each 12

## Toshiba ... 1 year

P321 S/P printer (80 col., 216 cps) ... \$519.

P351 S/P printer Mod 2 (136 col., 288 cps) 1049.

Toshiba T1100 PLUS Laptop Computer ... call

Toshiba T3100 Laptop Computer ... call

## Tseng Labs ... 1 year

EVA 480 (supports 640x480 resolution, includes drivers for Lotus 1-2-3 ver. 1A) ... 399.

## Video 7 ... 2 years

VEGA (half-card) ... 329.

VEGA Deluxe ... 399.

## DRIVES

### I2 interface ... 1 year

20 Meg Hard Drive Card (85 ms) ... 459.

### IOmega ... 90 days

Bernoulli Box 20 Meg w/PC2 card ... 1849.

10 Meg cartridge ... 57.

Bernoulli Box 40 Meg w/PC2 card ... 2449.

PC2B (bootable) Card ... 229.

20 Meg cartridge ... 79.

### Mountain Computer ... 1 year

Both Drive Cards include Q & A Software.

Drive Card 20 Meg (80 ms) ... 519.

Drive Card 30 Meg (78 ms) ... 599.

### Seagate ... 1 year

20 Meg Internal Hard Drive (w/Western Digital controller and cables, 65 ms) ... 389.

30 Meg Internal Hard Drive (w/Adaptec RLL controller and cables, 65 ms) ... 489.

20 Meg Internal Hard Drive for AT (40 ms) 569.

### Tandon ... 1 year

New Business Card 20 Meg (85 ms) ... 399.

### TEAC ... 1 year

PC, XT 360k Drive (5 1/4" half-height) ... 109.

### Toshiba ... 1 year

PC, XT 360k Drive (5 1/4" half-height) ... 109.

AT 360k Drive (5 1/4" half-height) ... 117.

### Western Digital ... 1 year

File Card 20 Meg (w/XTREE, 80 ms) ... call

## MEMORY

64k Upgrade Set (150 ns, set of 9) ... 15.

256k Upgrade Set (150 ns, set of 9) ... 35.

## DISKS

All disks have a lifetime warranty.

### DS/DD Disks for the PC & XT (40 TPI).

Verbatim Datalife (10 disks per box) ... 15.

Maxell MD-2 (10 disks per box) ... 19.

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## DS/High Density Disks for the AT (96 TPI).

Fuj (10 disks per box) ... \$27.

Verbatim (10 disks per box) ... 29.

Maxell (10 disks per box) ... 34.

## 3 1/2" Double-sided Diskettes (720k)

Verbatim (10 diskettes) ... 26.

Sony (10 diskettes) ... 26.

MAXELL (10 diskettes) ... 26.

3M (10 diskettes) ... 27.

BASF (5 diskettes) ... 14.

## MISCELLANEOUS

### Automation Facilities

Floppicide Disk Drive Cleaner ... \$18.

### Compuserve Information Service

(includes subscription, manual, \$25 usage credit, monthly publications) ... 24.

Dow Jones Membership Kit ... 24.

### Environmental Software

Nylon Computer Covers PC, XT or AT ... 20.

### Innovative Concepts

Flip n' File 50 (holds 50 disks) ... 16.

Flip Sort (holds 70 disks) ... 15.

### PC Connection

Computer Toolkit (all the tools you need to go with your PC in a software style binder) ... 29.

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- We accept VISA and MASTERCARD.
- No surcharge added for credit card orders.
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order.
- No sales tax.
- All U.S. shipments insured, no additional charge.
- APO/FPO orders usually shipped 1st Class Mail.
- Allow 1 week for personal and company checks to clear.
- UPS Next Day Air available.
- CDD max \$1000. Cash or certified check.
- 120 day limited warranty on all products.\*
- To order, call us anytime Monday thru Friday 9:00 to 9:00, or Saturday 9:00 to 5:30. You can call our business offices at 603/446-3383 Monday through Friday 9:00 to 5:30.

## SHIPPING

Note: Accounts on net terms pay actual shipping.

### Continental US:

- For monitors, printers, and drives, add 2% for UPS ground. Call for UPS 2nd Day & Next Day Air.
- For computers, pay actual charges. Call for UPS 2nd Day & Next Day Air.
- For all other items, add \$2 per order to cover UPS shipping. For such items, we automatically use UPS 2nd Day Air at no extra charge if you are more than 2 days from us by UPS ground.
- Hawaii:
- For monitors, printers, and drives, actual UPS Blue charge will be added. For all other items, add \$2 per order.
- Alaska and outside Continental US:
- Call 603/446-3383 for information.

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## PC Pastimes.

### The play's the thing.

For years, industry fuddie duddies have been trying to figure out the extraordinary attraction of our industrious fuzzy wuzzies. How, they ask themselves, did a bunch of small tree-climbing carnivorous mammals manage to metamorphose the miniature maildrop of Marlow, NH (pop. 545) into a micro mail-order monolith?

Well, our masked mascots aren't too concerned with the secret of their success—they're too busy enjoying themselves. And so are we. Because helping you put together perfect PC systems (at superlative prices) is our idea of a good time.

### Everybody wins.

We know it's no fun struggling late into the night with an obsolete program when you could be snuggling up to your favorite furry friend. Or tearing your hair out over some incomprehensible instal-

lation when you could be enjoying some innocent interlude. That's why we sell only the latest versions of products at the lowest prices, and make sure that you have everything you need to get up and running. We even have a special tech support number (1-800-PCC-TECH) staffed by perpetually positive-thinking pros who can make any set-up a pleasure.

### Get on the (joy) stick!



Give your PC the bird—with Hopper. Together at last with PC Man, on one disk. Offer not available to net accounts. Limit one per customer.

We know there's nothing like taking a break from the Great American Novel or Ultimate Spreadsheet to indulge in a little light electronic amusement. So we're offering a free copy of our very own *PC Man and Hopper* to anyone who places a \$500 order between now and March 31.

Just call 1-800/243-8088 or 1-603/446-3383, M-F 9:00 to 9:00; Saturday to 5:30. If you're planning to visit, call ahead to make sure what you want is in stock.

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## ■ PAGE DESCRIPTION LANGUAGES

facilitate more-modest hardware requirements and faster processing. The thinking was that applications programs could provide the rarely needed routines that would otherwise clutter up the Interpress system.

For network use, Interpress supports full pathnames (such as those used in Ethernet and the Xerox Network System). It also supports a defined method of having an application query a printer to determine what style and method of printing will be used. The application then can use this information to customize the output.

Interpress uses a binary representation for its commands and files—a more compact representation than that provided by PostScript. That setup saves storage, but more importantly, it can cut the time it takes to send some kinds of complex images over a standard 9,600-bit-per-second serial printer interface from as much as 20 minutes per page to less than 10. For debugging routines, Xerox also has utilities that translate that binary code back and forth into a more readily recognizable and readable form.

Interpress is now available in three upwardly compatible versions (a commercial set, a publication set, and a professional graphics set) to accommodate different combinations of software and hardware and various uses. And Interpress has been implemented by Xerox on some of its minicomputer-level systems.

From the PC user's point of view, though, the biggest drawback to Interpress is the lack of product support. Although Xerox is committed to supporting Interpress and has garnered commitments from several dozen other vendors, none of the implementations is on a PC-class machine. Even at Xerox, Interpress is available on larger-page printers like the 3700 and 8700 but not on their desktop machines like the 4045 CP.

**DDL** DDL, the newest of the three major page description languages, naturally seems to include most of the desirable elements of the two other languages. It is programmable much like PostScript, and it has document control features that Imagen claims are superior to those of Interpress.

DDL's document structure features allow the language not only to handle duplexing and to print selective pages but

also to feed longer print runs to several printers running in parallel for faster turnaround time.

DDL can handle both outline fonts (defined as shapes) and bit-mapped fonts (defined as arrays of dots), with an added filip. When scaling fonts, DDL applies certain rules about the proper proportioning of stroke widths and font size, creating what Imagen calls "intelligent scaling."

### ■ DDL includes automatic caching of composite objects and memory management.

The Imagen implementation of DDL also includes automatic caching of composite objects and memory management. The system saves the actual dot images of objects that have been placed on a page as long as possible, frequently allowing those images to be reused without requiring a repeat translation. So if you repeatedly use your company logo on a page, DDL might be able to translate it just once, whereas other PDLs might have to go from description to dots each time.

DDL can accept a binary representation of its commands, a full-text ASCII file, or a combination of the two. This allows ASCII commands to be used for development and binary commands to be used when efficiency is more important.

DDL is Imagen's second page description language (the 1981 Impress language was the first). Although it shouldn't be as buggy as a first effort, DDL is still a relatively untried product.

Like Xerox's Interpress, DDL's major shortcoming is the lack of available products that work with it. Although Hewlett-Packard is supporting DDL as its page description language for the Laserjet and has even promised to support some type of retrofit capability, the firm says that for most applications the current Printer Control Language (PCL) will suffice. No DDL systems were yet available for sale when this article went to press.

**MORE OPTIONS** In addition to these page description languages, several printer firms support more-restricted or proprietary standards. QMS supports PostScript and its own QUIC language. AST's new TurboLaser uses LaserLanguage, a PDL from LaserMaster.

Also, a few formatting languages and systems could be considered "near-page description languages." The most visible are Tex and roff. Tex was developed by mathematician Donald Knuth to facilitate the high-quality formatting of technical papers, and roff is the progenitor of a class of standard formatters on the UNIX system. Both are more concerned with line-by-line formatting and do not support full-page views or complex graphics.

Less visible but also in wide use are lower-level graphics routines and formats that are embedded in a number of products. Graphic Software Systems' GSS-VDI and GSS-Toolkit Metafile Interpreter fall into that class, as does Media Cybernetics's *Dr. Halo*. If one of these products were implemented directly on a chip—and they are perhaps better matches to the new generation of graphics chips than are page description languages—it might prove an attractive alternative.

**KEEP POSTED** In real estate the three most important factors are location, location, and location. In page description languages it's hardware implementations, system software implementations, and applications.

By that standard, Adobe's PostScript is clearly the current leader among PDLs. However, Hewlett-Packard's recent endorsement of the competing DDL could quickly change that situation. And so could any announcement by IBM Corp. of a favored page description language.

If you cannot put off a planning or buying decision, go with the PDL that your applications software supports (see the accompanying table for the PDL that some common software packages support). But the best choice is to keep posted. Lots of new developments are in progress. ☐

*Steve Rosenthal is a Berkeley, California-based free-lance writer and is the producer of the weekly television program, "The Computer Show."*

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# SLIDING in MEMORY

## 14 Hard Disk Cards

**T**he hundreds of dollars you can save by installing your own hard disk might tempt you into tangling with high-tech electronics. But when it comes to actually digging into the intricate circuitry of your PC, fear of tempting fate may put you off. Bloody knuckles and blood-boiling frustration aren't the worst that could happen: one false move and you could be looking at a \$100-per-hour service charge at the repair shop.

But now you can put these trepidations aside. Installing a hard disk can be as easy as sliding an ordinary expansion board into your PC if you choose to purchase one of the clever miracles of miniaturization examined here, collectively described as hard disk cards.

**COMPETITIVE EDGE** The history of these new products is brief. Little more than 18 months ago, some marketing genius at a disk drive company rediscovered that the three greatest motivators in modern America are sex, greed, and fear. Because automotive and computer software advertising had preempted the first two, he settled for using the last to give his product a competitive edge. One product that lent itself particularly well to this marketing approach was the hard disk card.

The first such card was Plus Development Corp.'s HardCard. When it was released, the HardCard was the easiest-to-install hard disk drive on the PC market, eliminating the fears of computer damage during do-it-yourself hard disk installa-

*A hard disk card in your PC or XT can give you that much-needed hard disk without usurping a disk drive bay or cluttering your precious desk space with an expansion chassis. The 14 hard disk cards reviewed here are complete systems, and most of them are easy to install. From that common ground, each one goes its separate way.*

## ■ HARD DISK CARDS

tion. Anyone with a screwdriver and enough manual dexterity to twist the top off a bottle could install a hard disk once the drive was integrated with its controller electronics and squeezed onto a single expansion card.

The HardCard delivered more than the promise of freedom from electrical fires and similar dire fates. A drive-in-the-slot was (and still is) the only way to add a hard disk to a PC or an XT without eliminating the use of a disk drive bay or slicing up your desk space with an expansion chassis. Furthermore, the diminutive HardCard performed superbly without requiring you to boost the low output of your PC's power supply.

**PROLIFERATING MARKET** The HardCard proved so popular that within a few months other hard disk cards were popping up like mushrooms after an August thunderstorm. Two new technologies made them possible.

About the time the HardCard was introduced, the first 3½-inch hard disks became available to OEMs in force. Also about then, several manufacturers of disk controllers shrank their products down to half the length of an expansion slot. Combining these two innovations (some looked like they were assembled with finesse, others like they were cut out with a rusty saber saw and thrown together in a garage) allowed nearly anyone to build and sell his own line of hard disk cards at a fraction of Plus Development's \$1,095 introductory price.

Of course, once the market was infested with a bountiful supply of hard disk cards, manufacturers were pressed to make the products stand out. Most elected to make their hard disk cards better by packing more megabytes into every expansion slot, adding software to make using the new hard disk easier, cutting power consumption, and supporting a wider variety of operating systems.

Competition and technology have combined to force prices down, too. With a little shopping around, you should be able to find hard disk cards retailing at under \$400. In some cases, hard disk cards are actually less expensive than their old-fashioned separate hard disk drive-and-controller kin.

**PLAYING THE CARDS** *PC Magazine* has examined hard disk cards twice before. In the December 10, 1985, issue (Volume 4 Number 25), the original HardCard was reviewed; its first wave of competition was discussed in the March 25, 1986, issue (Volume 5 Number 6). Since then, more than a dozen new products have been introduced. Those examined here are among the most recent.

■ When it was released, the Plus Development HardCard was the easiest-to-install hard disk drive on the PC market.

All the hard disk cards reviewed here are complete systems, and each can be installed simply by plugging it into an expansion slot. But all go beyond that, demonstrating features that make each an individual.

Besides storage capacity, the two most important distinguishing characteristics are the amount of space and the power each one requires. These factors govern whether a specific product will fit inside your system and work with it without modification.

Notwithstanding the hype, product claims, and product innovations, only the original HardCard and HardCard 20 from Plus Development will actually squeeze into any single full-length expansion slot in a PC or XT. All the other hard disk cards are somewhat thicker than the width of an XT expansion slot (0.8 inch). All use some kind of subterfuge to minimize their slot consumption. Some, in fact, may require you to do more work to install the hard disk card than would be needed to slide in a two-piece hard disk system.

The oft-made claim of requiring merely a slot and a half is predicated on your using a half-length expansion card in the slot next to the hard disk card. The far end of that slot (actually the end nearest the front of your computer) is taken up by the excess

width of the disk drive on the hard disk card itself. Other systems may ask you to reorganize the inside of your PC—usually by moving the speaker—to gain extra space not generally located over a usable expansion slot.

**POWER AND OTHER ISSUES** Power is a problem with every hard disk card that's installed in an ordinary PC. The 63.5-watt power supply with which IBM equipped those machines is marginally able to run any hard disk. A 13-watt hard disk card cuts the power available by almost one quarter. Whether a specific system can survive that much of a power drain depends on the options that have already been installed in it.

As a general rule, an ordinary PC can supply two of the following three expansion options: a hard disk card, an internal modem, and full memory expansion. Any additional expansion cards (not counting the floppy disk controller) further reduce the chances of successfully operating a hard disk card.

Insufficient power inevitably results in the system crashing—irrevocably locking up—either when you first turn it on or unexpectedly anytime thereafter. The crash will wipe out all your current work and, if it happens at a particularly unpropitious time, may make all the information stored on the hard disk card itself unusable. In other words, if you've got to stuff a lot of accessories inside your PC, you should plan on adding a bigger power supply.

Hard disk cards draw power from your PC in one of two ways. Many get all the current they need through the bus connector at the bottom of the expansion slot. Others require you to run a separate wire directly to your PC's power supply.

The means through which a drive gets its power does not affect how much power it consumes, but it may affect how easily you can install the drive. PCs with two floppy disk drives have no spare power connectors to devote to a hard disk, so you'll need a wye cable to split off a supply of electricity. Usually (but not always) this cable is supplied with the hard disk card. Thus you'll have to contend with yet another set of wires straggling through your computer.

XTs, which are factory equipped with a

135-watt power supply, have no problem furnishing enough power to run a hard disk card. When you try to install more than one hard disk in a system, however—particularly with separate hard disk controllers—difficulties can arise. If two disk controllers try to occupy the same memory address, it's likely that neither will work properly.

Many disk cards give you the option of varying the address assignment of the firmware in their controllers so that you can make them compatible with existing or future hard disk additions. Others allow you to operate a second hard disk directly from the controller on the hard disk card. If you're planning to add to your system's hard disk endowment eventually, make sure that you don't limit yourself with an unwilling and unexpandable hard disk card.

In general, hard disk cards will work when installed in an AT or its equivalent, but compared to an AT hard disk, they won't work very well. None of the little hard disks installed on any of the products examined here meets the IBM performance specification for an AT disk (40 milliseconds average access time). Worse yet, all these hard disk cards use the PC- and XT-style 8-bit data bus; thus they move data to and from a host AT only half as fast as does a genuine AT disk, which uses a full 16-bit data bus connection.

The hard disks installed on hard disk cards share identical virtues and weaknesses with their more ordinary counterparts. Both types of hard disks use the same kinds of media—plated or oxide-coated disks—and they may or may not have an automatic park-and-lock feature to pull the heads away from the platter when the power goes off. Both plated media and automatic park-and-lock features help prevent head crashes.

For size reasons, all the systems reviewed here use 3½-inch hard disks, and all use band-stepper head actuators—the same mechanism common on ordinary drives, which is considered a low-performance solution.

#### DEPARTING FROM THE NORM

One point at which these hard disk cards depart from the norm is the sector interleave factor that they use. The sector inter-

leave specifies the number of physical disk sectors that are skipped when sequential logical sectors are written or read. A lower sector interleave, in general, gives better performance, but slower computers (like the PC and the XT) often do not benefit from an extreme reduction in interleave. The IBM standard sector interleave on XT hard disks is 6; for the AT, 3.

The controllers in hard disk cards use the same designs and techniques as free-standing disk controllers. Although all those examined here use the standard ST-506 interface, some use modified frequency modulation (MFM) data coding, while others use run length limited (RLL) coding. The former moves data between the disk and the controller at 5 MHz; the latter does it at 7.5 MHz and can pack 50 percent more data onto a given hard disk. (For a more complete explanation of sector interleave and RLL, see "Supercharging XT Hard Disk Performance," *PC Magazine*, Volume 5 Number 21.) The type of data coding that's used can affect system performance, but otherwise it's essentially invisible; the data coding system has no outward effect on how you control and use the hard disk card.

PC Labs tested the performance of all the hard disk cards examined here and found significant differences among them (see benchmark tests). All, however, offer disk access speeds that are an order of magnitude faster than those of floppy disks. That speed—and the additional storage capacity you gain without losing a disk drive bay—are the best recommendations for these products. Here's a closer look at each one.

### Basic Time Hardpack

Unique among hard disk cards, the 20-megabyte Basic Time Hardpack is the short card of hard disks. Its controller section is bolted underneath the hard disk, which extends to the right of the expansion slot in which it is installed. Although the package is nearly three XT slots thick, it's under 5 inches long, which makes it just small enough to slide (tightly) into an XT short slot or the rightmost PC slot and extend behind the A: floppy disk drive bay. As a result, the Hardpack can be installed in a PC (in slot 5) with the sacrifice of a sin-



## FACT FILE

#### Basic Time Hardpack

Basic Time Inc.  
3040 Oakmead Village Dr.  
Santa Clara, CA 95051  
(408) 727-0877  
List Price: \$599

Requires: DOS 2.0 or later.

In Short: A 20-Mbyte hard disk short card that uses one slot in a PC or the two short slots in an XT by fitting behind drive A:.

CIRCLE 100 ON READER SERVICE CARD

gle slot. In an XT, it's designed for slot 7 and consumes both short slots.

The mounting scheme—with naught but one screw on the mounting bracket holding the Hardpack in place—seems about as secure as a watermelon on a stick. However, the Hardpack fits in so tightly against the resident floppy disk drive that it doesn't have a chance to wobble.

The Hardpack requires a direct power connection to run its Tandon TM 262 disk drive. A wye cable is an optional accessory here, even though it's a necessity in two-drive PCs that have too few connectors on their power supplies to attach the Hardpack.

The Hardpack controller card, made by Basic Time using the Western Digital chip set, has the potential for controlling two hard disk drives. The Basic Time instructions, however, do not exploit this feature, nor do they document any way of adding the Hardpack to a system with another hard disk already installed. With respect to clarity, as opposed to depth, the documentation is quite good.

The Hardpack is delivered with its low-level format already defined and requires merely running the standard DOS utilities FDISK and FORMAT to use. The standard sector interleave is 6—the IBM XT standard. A low-level-formatting program, which is supplied with the drive, allows you to alter the interleave factor, as well as several other drive parameters. If you like to experiment, you can try to soup up your hard disk system.

Also included with the Hardpack is IDIR, a DOS shell aimed at aiding in hard disk management. This program has a loy-

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## Access Speed

The Express Hard DiskCards, with an average access speed of 60 msec, gives you—in addition to that extra speed—head retraction. Before you start thinking you've just got to have head retraction, you should

know that the 80 msec Express Hard DiskCards are rated at 50 g's poweroff and 10 g's poweron. Furthermore, our 80 msec Hard DiskCards, like all Express Hard DiskCards, have plated media. Most hard disks-on-a-card have iron oxide (it looks and acts like rust), which means if the head hits the iron oxide, it will gouge out media and your data along with it. Plated media, on the other hand, looks like a car's chrome bumper. If the head hits, it will cause little or no damage. That's why Express offers drives with high g tolerances.

All of the benefits of our 80 msec drives aside, you may want to get our 60 msec drive just for the extra speed. But in addition to increased

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However, if you don't have a

Features	20AT**	2080	Models					
			2060	3080	3060	4080	6060	
Capacity formatted	20.05MB	20.00MB	20.05MB	30MB	30.08MB	40.00MB	60.16MB	
Transfer rate	5Mbits/sec*	5Mbits/sec	5Mbits/sec	7.5Mbits/sec	7.5Mbits/sec	5Mbits/sec	7.5Mbits/sec	
Avg. access time	60msec	80msec	60msec	80msec	60msec	80msec	60msec	
Slots	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	2	2	
Media	Plated	Plated	Plated	Plated	Plated	Plated	Plated	
Warranty	1 year	90 days	1 year	1 1/2 years	2 years	2 years	2 years	
Head lifter	automatic	manual	automatic	manual	automatic	manual	automatic	
Price	\$449	\$495	\$595	\$695	\$795	\$995	\$1,095	



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hard disk now and want 40 or 60 megabytes of hard disk storage, then our Express Double DiskCard™ comes with two hard disks. You can use one disk to back up the other with our automatic backup software *Auto DiskSave™* or for an extra \$95, you can buy *Coalesce* and have both disks work as one.

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All Express Hard DiskCards are available with a free backup program, *DS Backup™*. This easy and convenient program—a \$69.95 value—makes backing up simple and fast. And to receive it, all you have to do is ask for it when you order.

### AT Backup DiskCard™

How would you like to know that your IBM AT's hard disk is always backed up without having to think about it. With Express Systems' AT Backup DiskCard™ you can have 20 megabytes of hard disk backup on a card without taking up valuable front panel space. The AT Backup DiskCard comes with *Auto DiskSave* software, so you



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Formatted Storage Capacity in Mbytes	Height	Plated Media	Average Access	Comments	PC or PC/XT	AT
10	1/2	no	85 msec	Low power	\$ 295	N/A
31	1/2	yes	85 msec	Low power	Call	Call
22	Full	no	30 msec	CDC WREN II drive	\$1,295	\$1,195
72	Full	no	25 msec	Ideal AT drive for LAN	\$1,795	\$1,695
144	Full	no	30 msec	2.72MB drives as one volume	†	\$3,395

### Removable Hard Disk

10	1/2	yes	90 msec	5 Mbits/s	\$1,095	\$1,095
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### Tape Systems and Subsystems

Formatted Storage Capacity	Height	Date Transfer Rate (k/sec)	PC or PC/XT	AT
60 Mbytes	1/2	88	\$ 795	\$ 795
60 Mbytes Subsystem		88	\$ 1,045	\$ 1,045
21 Mbytes (unformatted) Start/stop Subsystem		24	\$ 445	\$ 445
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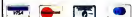
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\*\*\*For IBM AT and compatibles, the interleave factor is dependent on its controller.

†Takes up 1 1/2 slots and works beside any 1/2 slot board such as floppy controller.

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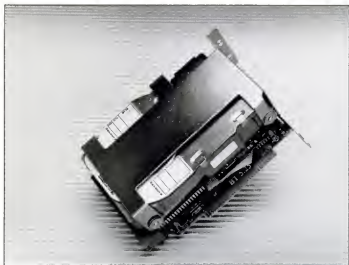
Express Systems, Inc., 1254 Remington, Schaumburg, IL 60195

CIRCLE 380 ON READER SERVICE CARD

IBM



## ■ HARD DISK CARDS



Basic Time's Hardpack is just under 5 inches long and can fit in a single slot in your PC.

al (and vociferous) following as a substitute DOS interface and may be a godsend to new hard disk owners.

Although one of the slowest drives tested, the Hardpack nevertheless has adequate performance for most applications. It rates as the best choice in hard disk cards only when its unique mounting scheme is a paramount consideration.

### CMS Drive Plus 21

The CMS Drive Plus 21 represents a mating of two well-known and highly regarded components, the Western Digital 1002A WX1 controller and the Tandem 20-megabyte hard disk. The result is a smoothly performing system with an unusual design twist.

The twist is the mounting of the drive.



The CMS Drive Plus 21 is frugal in its electricity consumption, requiring only 10 watts.

Like most hard disk cards, the Drive Plus 21 consists of a mounting frame that holds a 3½-inch drive and a short-card disk controller end to end. Unlike most other hard disk cards, however, the Drive Plus 21 disk is near the middle, rather than at the far end, of the left side of the assembly. As a result, the Drive Plus 21 requires two full slots, and a short card will not fit next to it.

It will fit, though, into the leftmost drive slot, and there it impinges on no others. The rearward-mounted drive easily clears the loudspeaker in the host PC or XT with no further ado. Thus, though nominally a slot-hogger, the Drive Plus 21 can be a slot-saver in some situations.

(The Drive Plus 21 should not be confused with the same manufacturer's earlier model, the Drive Plus 20, on which the disk drive is mounted in a more conventional style.)

The Tandem drive in the Drive Plus 21 performs modestly: it uses the industry standard ST-506 interface and MFM, but its heads do not automatically park and lock when the drive is turned off. (Automatic parking is available in a more expensive 20-megabyte Drive Plus model, and another model is available with a faster SCSI interface between the drive and controller.)

Among the hard disk cards reviewed here, the Drive Plus 21 is one of the more frugal with electricity: it requires only 10 watts. Nevertheless, CMS recommends installing a 135-watt power supply in a PC in which the product will be used.

Installing the Drive Plus 21 is a breeze.



### FACT FILE

#### CMS Drive Plus 21

CMS  
3080 Airway Ave.  
Costa Mesa, CA 92626  
(714) 549-9111  
List Price: \$695

Requires: DOS 2.0 or later. Drive Plus 21 will not accommodate a second hard drive in the system.

In Short: A 20-Mbyte hard disk card that fits in a single slot when installed in slot 1 (the leftmost slot) behind the loudspeaker in a PC or XT; otherwise it requires two slots.

CIRCLE 687 ON READER SERVICE CARD

with no switches to set or jumpers to jump. However, to gain this installation ease, flexibility is sacrificed, and the Drive Plus 21 must be the first hard disk in the host system, configured identically to a factory-standard XT hard disk. An additional hard disk might be installed as drive D:, but not with CMS support.

According to the instructions, the Drive Plus 21 arrives requiring you to partition it with FDISK and use the DOS FORMAT utility to get it running. On the evaluation drive received by PC Labs, however, both operations had been handled at the factory, and only the operating system needed to be installed on the disk using the SYS utility.

No software is supplied with the Drive Plus 21, and no drive activity indicator is provided. Even the instructions are scanty, though reasonably clear.

## Express Systems 2060, 3060, and 6060

The family resemblance among these three products is strong, but each one of the Express Systems hard disk cards is distinctly different. However, all are based on exactly the same mounting hardware and are accompanied by exactly the same mediocre instructions. The entire threesome is based on the same model of 3½-inch hard disk, a La Pine Technology Titan 3532, with a nominal 20-megabyte capacity. Each sys-

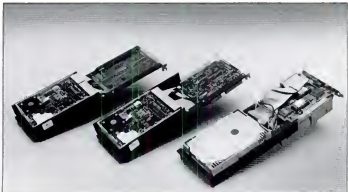
tem also uses a Scientific Micro Systems controller. The most obvious difference among them is capacity. The 2060 holds 20 megabytes; the 3060, 30 megabytes; and the 6060, 60 megabytes.

The ever-larger capacities are achieved through increasing sophistication. The 2060 is based on an SMS OMTI 5510 controller, which uses MFM data coding. The 3060, which uses the SMS OMTI 5527 controller and RLL for greater capacity, has a 7.5-MHz data transfer rate. The 6060 simply adds a second La Pine Technology drive to the single-drive 3060 chassis.

The La Pine Technology drive rates as a sturdy choice. It uses plated platters, and its read/write heads automatically lift away from the disk and retract when the power to the mechanism goes off.

The SMS controller of each of the two single-drive systems can handle a second hard disk. However, the instructions that come with the products do not indicate how to go about doing so; you must contact the factory to learn the secrets.

The two single-drive units each require a slot and a half, with the drive sticking out to the left of the full-length expansion slot that's used. The 6060 is rated (optimistically) as taking two slots. Unless you're careful about the slot you slide it into, however, even in the wide-slotted PC you might reasonably expect to write off three slots because the card is thick—more than 2 inches thick—with a drive at both ends.



Express Systems' 2060, 3060, and 6060 hard cards each use a Scientific Micro Systems controller and a La Pine Technology Titan 3532 hard disk. While the 2060 and 3060 consume just a little over 12 watts each, the 6060 needs a full 24 watts, nearly half the output of a PC.



## FACT FILE

### Express Systems 2060

Express Systems  
1254½ Remington Rd.  
Schaumburg, IL 60196  
(800) 341-7549  
(312) 882-7733

List Price: \$595

Requires: DOS 2.1 or later.

In Short: A 20-Mbyte hard disk card that requires one and a half slots in a PC or XT.

CIRCLE 686 ON READER SERVICE CARD

### Express Systems 3060

Express Systems  
1254½ Remington Rd.  
Schaumburg, IL 60196  
(800) 341-7549  
(312) 882-7733

List Price: \$795

Requires: DOS 2.1 or later.

In Short: A 30-Mbyte RLL-based hard disk card that requires one and a half slots in a PC or XT.

CIRCLE 688 ON READER SERVICE CARD

### Express Systems 6060

Express Systems  
1254½ Remington Rd.  
Schaumburg, IL 60196  
(800) 341-7549  
(312) 882-7733

List Price: \$1,095

Requires: DOS 2.1 or later.

In Short: A double-disk 60-Mbyte RLL-based hard disk card that requires three slots in an XT. It also requires 24 watts, more than most PCs can supply.

CIRCLE 684 ON READER SERVICE CARD

Don't count on using the 6060 in an unmodified PC, either. Although the two smaller Express Systems units are rather typical in their power needs—each one draws little more than a dozen watts—the 6060 swallows a full 24, nearly half the output of a PC. You'll definitely need additional power to use it in such a system.

All three models tap part of their electrical needs directly from the host system's power supply. A short adapter cable is installed on each drive—it's short enough to limit your choice of which slot you install the system in.

The drives received for evaluation were preformatted. Express Systems supplies several utilities with these cards, including three low-level-formatting programs: one

## ■ HARD DISK CARDS



### Hard Disk Cards: Summary of Features

Product		List price	Capacity (Mbytes)	No. of slots	Power consumption (watts)	Power connection	Setup Features									
							Preformatted	Self-formatting utility	Auto-configuration to highest drive	Automatic head park	Activity indicator on-screen	Works with hard disk	Controls hard disk	Works with 2nd hard card	Controls 2nd hard card	
PC	Standard Brand Flash Card-20	\$429	20	1½	13	Direct	●	●	○ (head lifter)	○	○	●	●	○	○	
PC	Standard Brand Flash Card-30	\$495	32	1½	13	Direct	●	●	○ (head lifter)	○	○	●	●	○	○	
Express Systems 2060		\$595	20	1 or 1½	13	Direct	●	●	●	○	○	●	●	●	●	
Basic Time Hardpack		\$599	20	1, 2, or 3	14	Direct	●	●	○	○	○	●	●	○	○	
Sydneyal PhD System*		\$669	10	1	12	Bus	●	●	●	●	○	●	●	●	●	
CMS Drive Plus 21		\$695	21	1 or 2	10	Bus	●	●	○	○	○	○	○	○	○	
Maynard Onboard 10		\$695	10	1 or 1½	12	Bus	●	●	●	○	●	●	●	●	○	
Plus Development HardCard*		\$695	10	1	11	Bus	●	●	○	●	●	●	○	●	○	
Tandon BusinessCard 21*		\$750	21	1 or 1½	11	Bus	●	●	○	○	○	●	●	●	○	
Express Systems 3060		\$795	30	1 or 1½	14	Direct	●	●	●	●	○ RLL only	●	●	●	●	
Western Digital FileCard*		\$795	10	1 or 1½	5	Bus	○	●	○	●	○	●	●	○	○	
iPCard 20		\$805	21	2 for PC, 3 for XT	12	Direct	●	●	●	●	○	●	●	●	●	
iPCard 30		\$895	32	2 for PC, 3 for XT	12	Direct	●	●	●	●	○ RLL only	●	●	●	●	
Maynard Deboard 20		\$895	20	1 or 1½	12	Bus	●	●	●	○	●	●	●	○	○	
PC	Plus Development HardCard 20	\$895	21	1	8	Bus	●	●	○	●	●	●	○	●	○	
Western Digital FileCard 26*		\$895	20	1½	5	Bus	○	●	○	○	○	●	●	○	○	
Mountain Computer DriveCard 20*		\$995	20	1½	13	Direct	●	●	●	○	○	● (PC,XT)	●	●	●	
Express Systems 6060		\$1,095	60	2 or 3	24	Direct	●	●	●	●	○	○	○	●†	●†	
Mountain Computer DriveCard 30		\$1,195	30	1 or 1½	13½	Bus	●	●	●	●	○	● (PC,XT)	●	●	●	
Maynard Deboard 30		\$1,325	30	1 or 1½	12.5	Bus	●	●	●	○	○	●	●	●	○	

† Indicates Editor's Choice (among products reviewed in this issue). ●—Yes ○—No \*Previously reviewed †Sold packaged with a second hard card. ††Uses 13 watts while active, 6 watts when idle.

which sets the interleave at 5, one for an interleave of 2, and one for an interleave of 1. Drives set by the factory have an interleave factor of 2.

In general, as capacity increased, the performance of the Express Systems drives decreased. However, all three units scored on the fast side of average in PC Labs tests. They are workable additions to any system, although the usefulness of the 60-megabyte unit is doubtful.

### I²Card 20 and 30

Some very clever design features give both these I² Interface I²Cards the makings of excellent products with top-notch performance, but regrettably neither hard disk card lives up to its potential. The shortfall is further accentuated by possibly the worst instructions and documentation in this product class.

The 30-megabyte I²Card combines a La Pine Technology Titan 3532 drive,

which has a nominal capacity of 20 megabytes, with a Scientific Micro Systems OMTI 5527 controller, which uses RLL to push its capacity up to 32 megabytes.

The 20-megabyte version is built around a Tandon 362 drive and SMS OMTI 5510 controller, which uses ordinary MFM data coding.

In both cases, the little 3½-inch drive and short card controller are screwed to the

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### Concept Card™ suggested retail prices:

- Model CC-T20 — 21-megabyte (65-ms) — \$599
- Model CC-T30 — 32-megabyte (65-ms) — \$699
- Model CC-T40 — 42-megabyte (35-ms) — \$1,499
- Model CC-T60 — 63-megabyte (35-ms) — \$1,699

The Concept Card™ is available from a dealer near you or contact CCT directly at (201) 370-5000.

CIRCLE 484 ON READER SERVICE CARD

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LAKEWOOD, NJ 07031

(201) 370-5000

## ■ HARD DISK CARDS



### FACT FILE

#### I<sup>2</sup>Card 20

I<sup>2</sup> Interface Inc.  
21101 Osborne St.  
Canoga Park, CA 91304  
(818) 341-7914  
List Price: \$805

Requires: DOS 2.0 or later.

**In Short:** A 20-Mbyte hard disk card that requires two slots in a PC and three in an XT and promises—but does not deliver—top performance.

CIRCLE 682 ON READER SERVICE CARD

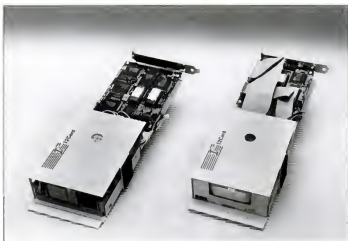
#### I<sup>2</sup>Card 30

I<sup>2</sup> Interface Inc.  
21101 Osborne St.  
Canoga Park, CA 91304  
(818) 341-7914  
List Price: \$895

Requires: DOS 2.0 or later.

**In Short:** A 30-Mbyte, RLL-based hard disk card that requires two slots in a PC and three in an XT and promises—but does not deliver—top performance.

CIRCLE 683 ON READER SERVICE CARD



Both the I<sup>2</sup>Card 20 and the I<sup>2</sup>Card 30 claim to be able to withstand a 10-G shock while operating. They should also survive shocks of 40 Gs and 60 Gs, respectively, when not in use.

right side of a mounting that consists of little more than a piece of sheet metal running the full length of a PC expansion slot. Although the drive itself, about 2 inches thick, takes up two expansion slots in a PC and possibly three in an XT, a short card will fit adjacent to the I<sup>2</sup>Card.

The I<sup>2</sup>Cards are apparently designed for performance. Their packaging claims they can read any data of any cylinder 300 percent faster than can a PC-XT hard disk.

To try to achieve that speed improvement, I<sup>2</sup> Interface enhances performance of both I<sup>2</sup>Cards with a sector interleave of 2 and a 2K-byte (about one disk allocation unit under DOS 3.0 or later) on-board data buffer.

The 30-megabyte version should also get a good boost from its RLL coding system, which has a data transfer rate of 7.5 MHz instead of 5. The La Pine Technology drive itself also has a rated average access time (according to the I<sup>2</sup> Interface packaging) of 65 milliseconds, which would be quick by hard disk card standards.

PC Labs tests found no practical performance advantage to either I<sup>2</sup>Card, however. Neither stood out from the pack on any benchmark (except that the Tandem drive

in the 20-megabyte I<sup>2</sup>Card proved itself one of the most sluggish performers of those tested, second only to the same model of drive on the Basic Time product). The La Pine Technology drive proved itself to be about average.

Neither I<sup>2</sup>Card is apparently designed to be frugal with power. The 20- and the 30-megabyte drives draw about 12 watts, which may strain an ordinary PC that has several internal expansion options.

The Tandem-equipped I<sup>2</sup>Card is rated to survive shocks of 40 Gs when not operating and 10 Gs when active. The plated platters of the La Pine Technology drive and its automatic head-parking earn the 30-megabyte I<sup>2</sup>Card a claim of tolerating a 10-G shock while operating and 60 Gs when not, according to I<sup>2</sup> Interface.

Notwithstanding that high degree of protection, the 30-megabyte I<sup>2</sup>Card was one of only two products examined here to suffer shipping damage to the disk. It had to be reformatted, with the loss of several bad sectors.

Both I<sup>2</sup>Cards require a separate power connection for the drive. A wye cable and an extension power cable are provided for that purpose.

As supplied from I<sup>2</sup> Interface, the

I<sup>2</sup>Cards are already partitioned and formatted for use with DOS 2.0 or 2.1. Merely installing either operating system on the I<sup>2</sup>Card will make it bootable. If you want to use one of the cards with DOS 3.0 or later, you will have to repartition and reformat it using a special program supplied on a utilities disk with the I<sup>2</sup>Card. This disk also contains backup software, a head-parking program, and a diagnostic/low-level-formatting utility.

The SMS controllers used on each I<sup>2</sup>Card are state-of-the-art products that rely heavily on VLSI and surface-mount components. But with the controller, the weaknesses of I<sup>2</sup> Interface's support became apparent. The controller is capable of great versatility and will handle two disk drives. In fact, I<sup>2</sup> Interface makes a point of mentioning on their packaging that the controller will handle drives up to 240 megabytes.

The documentation, however, does not tell you how to take advantage of this ability. In fact, the documentation is so brief (not unusual for this type of product) that it doesn't even mention how to set up the I<sup>2</sup>Card as anything other than drive C: in a system without another hard disk. Although both I<sup>2</sup>Cards should work ably in

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fact that they use standard DOS disk format for backups and "map out" bad sectors. But that won't do anything for disks damaged *after* the backups were made. FASTBACK\*'s special brilliance is a proprietary format that not only allows each disk to receive more data much faster than DOS, it also encodes Advanced Error Correction information that allows your vital data to be recovered even if you staple, scratch or mutilate your finished backup (tolerates up to 80 damaged sectors per disk!). You get what you pay for.

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## ■ HARD DISK CARDS

most systems, they hardly approach the promises made for them.

### Maynard Onboard 10, 20, and 30

Maynard Onboard 10, 20, and 30 rate as a true family. The products differ only in the hard disk on which they are based. All share the same software, disk controller, mounting scheme, and philosophy.

The foundation of the whole system is a sheet metal chassis that physically supports both the controller and its hard disk. It's essentially a 3½-inch drive slot that you mount in an expansion slot.

At the back of the Maynard mounting bracket is a proprietary Maynard hard disk

controller. Much like other brands of controller, the Maynard is about half a slot long and can control up to two drives using the standard ST-506 interface and MFMD data coding.

The Maynard controller functions identically to the standard IBM XT controller. In fact, it can be used to replace the IBM controller in an XT already equipped with a hard disk drive (either an IBM or Maynard).

All the Onboard series cards have a standard 3½-inch hard disk drive (the larger two drives appear to have been manufactured by JVC) bolted to the other end of the Maynard mounting bracket, sticking out on the left side of the full-length slot that's used. Because these drives are essentially unmodified and have a small circuit card of their own electronics attached underneath, the Onboard cards are appreciably thicker—two XT-size slots in width—at the drive end (toward the front of the host computer). A short expansion card can be mounted in the slot adjacent to the Onboard.

Maynard provides a special scheme for mounting an Onboard in a single slot. To do so requires moving the speaker from its normal location at the left front of the system unit to the front of the slot that's occupied by the floppy disk controller. Maynard supplies the required speaker

extension wire as standard equipment with the Onboard.

Although this speaker-moving is a clever idea for saving space in PCs with too few free slots, it defeats one of the primary reasons for choosing a hard disk card: ease of installation. Mounting an ordinary hard disk is no more difficult than moving a speaker. Further, if you want to use the Onboard controller to operate a conventionally mounted hard disk, you'll have to run two ribbon cables across the width of the expansion area, atop all your other expansion cards. The result is a messy installation.

All Onboard series cards come with low-level formatting already done. Setting them up requires running the standard DOS FDISK and FORMAT utilities.

Maynard supplies its own diagnostic software, which includes a low-level-format program that can be used on Maynard and standard IBM hard disks. This program allows you to set the sector interleave of your hard disks. The factory-supplied setting is 2.

A software utility is also supplied for controlling the visual/audible drive activity indicator. With the appropriate command, you can specify in which of the four corners of your monitor screen you want the visual activity indicator to appear. Or you can choose to switch the visual and/or



#### FACT FILE

##### Maynard Onboard 10

Maynard Electronics  
460 E. Semoran Blvd.  
Casselberry, FL 32707  
(305) 331-6402

List Price: \$695

Requires: DOS 2.0 or later.

**In Short:** A 10-Mbyte hard disk card, which requires one or one and a half slots in a PC or XT, that proved to have problems in PC Labs tests.

CIRCLE 681 ON READER SERVICE CARD

##### Maynard Onboard 20

Maynard Electronics  
460 E. Semoran Blvd.  
Casselberry, FL 32707  
(305) 331-6402

List Price: \$895

Requires: DOS 2.0 or later.

**In Short:** A 20-Mbyte hard disk card that requires one or one and a half slots in a PC or XT and caused display unsteadiness in an evaluation PC.

CIRCLE 680 ON READER SERVICE CARD

##### Maynard Onboard 30

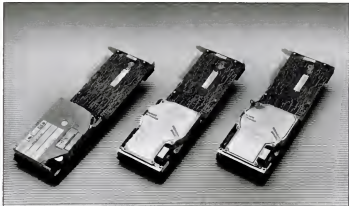
Maynard Electronics  
460 E. Semoran Blvd.  
Casselberry, FL 32707  
(305) 331-6402

List Price: \$1,325

Requires: DOS 2.0 or later.

**In Short:** A 30-Mbyte hard disk card that does not use RLL and requires one or one and a half slots in a PC or XT. It also caused display unsteadiness in an evaluation PC.

CIRCLE 679 ON READER SERVICE CARD



The diagnostic software Maynard supplies for its Onboard 10, 20, and 30 cards lets you set the sector interleave of your hard disk. Another software utility program supplied by the company lets you display the visual activity indicator in any of the four corners of your monitor.

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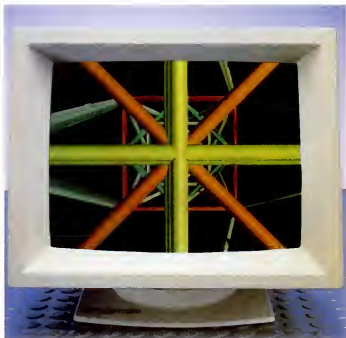


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1255 Michael Drive  
Wood Dale, Illinois 60191.

# NEC

## ■ HARD DISK CARDS

the audible indicators off entirely.

However, this last option caused problems when PC Labs ran its performance benchmark programs on the Onboard 10. When the indicator was turned off and the benchmark tests were run, the system crashed. On the other hand, the other two Onboards ran slightly faster with the indicator switched off.

The Onboard 10 had other problems during testing. It registered manifold data errors and general disk failure errors, possibly caused by power problems.

Maynard makes no claim as to power consumption in its Onboard documentation, but when any of the Onboard drives were installed in an ordinary 63.5-watt PC, head activity caused a perceptible quaking to the monitor display, indicating that the system was apparently very close to the danger point.

Overall, the Maynard drives proved to be on the slow side of average, and the shiftiness of the display would make one a worrisome addition to a PC.

## Mountain Computer DriveCard 30

Amid most hard disk cards, which are little more than mounting brackets, the 30-megabyte Mountain Computer DriveCard 30 stands out as a polished, well-integrated product. Its proprietary controller and Miniscribe 3½-inch hard disk are linked by a molded reinforced plastic framework, and the most fragile parts of the drive are protected by a decorative plastic shroud.



### FACT FILE

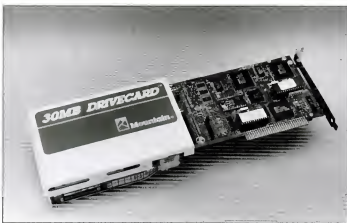
#### Mountain Computer DriveCard 30

Mountain Computer Inc.  
360 El Pueblo Rd.  
Scotts Valley, CA 95066  
(408) 438-6650  
List Price: \$1,195

Requires: DOS 2.1 or later.

**In Short:** A 30-Mbyte hard disk card that fits into one or one and a half slots and consistently delivered the fastest performance in PC Labs tests.

CIRCLE 678 ON READER SERVICE CARD



One of the DriveCard 30's utilities parks the hard disk heads to prevent damage during shipping.

An installation problem, however, tarnished its otherwise glossy image.

The hard disk controller on the DriveCard is a proprietary Mountain Computer product that uses the Scientific Micro System RLL chip set to pack 30 megabytes on a drive that's nominally rated at 20. RLL also ups the data transfer rate between the drive and controller to 7.5 MHz.

But the RLL controller imposes a compatibility penalty. The controller section of Mountain's earlier 20-megabyte DriveCard could also operate another disk drive, including the IBM-XT hard disk and several others made by Seagate and NEC. The RLL controller of the 30-megabyte DriveCard is compatible only with an auxiliary drive offered by Mountain.

The Miniscribe drive used in the DriveCard is unusual in having an idle mode, which reduces the power consumption of the DriveCard from 13 to 8 watts when the DriveCard is not in use. However, a PC's power problems are often caused by peak demand. Although less power consumption will help keep things cool, it may not entirely eliminate the unexpected crash from system overloads.

Although the DriveCard is nominally rated as occupying a slot and a half in most systems, it's actually apt to take more or less than that. If you remove the speaker from its normal position and use some unusual offset card edge guides, you can

shoehorn the DriveCard in one slot—the leftmost. (Of course, having to move the speaker obviates much of the ease of installation that made you select a hard disk card in the first place.) In any other slot, the plastic framework of the DriveCard may interfere with some half-length cards that have tall components near their top edge.

As an unusual but nice touch, Mountain includes special tape with the DriveCard that you can use to cover the ventilation holes under the disk drive bays on some models of PCs. This modification, which was made by IBM in later PCs, improves the cooling of the computer's expansion slots—and of the DriveCard.

Jumpers on the DriveCard allow you to select whether it functions as the first or second hard disk in your computer. The operational difference is the drive letter assigned to it and whether it will boot your computer. (Only hard disk C: is allowed to boot a PC.)

In addition to an installation program, Mountain includes several utilities with the DriveCard. One of the most valuable parks the hard disk heads to prevent damage during transportation and shipping. The Miniscribe drive does not automatically park and lock its heads, but the drive is able to withstand shocks of 10 Gs during operation and 50 Gs once the heads are parked. Another utility is used for low-level

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1255 Michael Drive  
Wood Dale, Illinois 60191.**

# NEC

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## ■ HARD DISK CARDS

el and DOS formatting of the DriveCard.

The low-level-format program allows you to set the sector interleave of the DriveCard between 1 and 16. The drive is sold with a low-level format on it that's compatible with DOS 3.0 and 3.1 using a sector interleave of 3. Another program modifies DOS when the DriveCard is installed in an AT, and another will test the DriveCard for bad sectors and deallocate any that it finds.

Mountain's instructions are excellent, and they reflect positively on the well-thought-out system.

Although the instructions claim the product is formatted for DOS 3.0 or 3.1, the Mountain automatic installation program reformats the drive. That process proved painful when an attempt was made to reinstall the DriveCard after it had suffered some shipping damage. The auto-installation software auto-destroyed a DOS 3.2 boot disk.

After that rather inauspicious beginning, however, the DriveCard proved to be consistently the fastest product when running PC Labs benchmark tests. If the last iota of speed matters most to you, the DriveCard may be your best choice.

## Plus Development HardCard 20

Plus Development started the whole hard-disk-on-a-card revolution with its introduction of the HardCard in 1985. The HardCard 20 differs from that trend-setting product primarily in the addition of a second platter inside its slender disk drive. Along the way, Plus shaved nearly 3 watts off the HardCard 20's power consumption—it draws only 8 watts—and modified its controller electronics (these changes are likely not unrelated). In the rest of its aspects, however, the system remains essentially the same. The result is the most refined hard disk card available—a product that should inspire great faith.

Unlike many hard disk cards, the HardCard 20 is extremely well integrated—not a mere collection of off-the-shelf parts. Rough edges in its design are few—just a couple of engineering change orders (little add-on wires) on the controller electronics. The whole drive assembly is pro-



## Benchmark Tests: Hard Disk Cards

### Performance Times

(Times given in seconds except where noted)

Product	DOS Disk Access (milli- seconds)	BIOS Disk Seek (milli- seconds)	File Access				
			Create	Sequen- tial write	Sequen- tial read	Random write	Random read
60-MEGABYTE CARDS							
Express Systems 6060	88	71	10	19	10	48	42
30-MEGABYTE CARDS							
Maynard Onboard 30	122	105	12	22	12	45	37
iCard 30	83	77	10	18	10	42	36
Mountain Computer DriveCard 30	74	72	10	18	10	26	19
Express Systems 3060	72	65	9	18	10	30	24
Standard Brand Flash Card-30	70	N A	10	18	10	20	15
20-MEGABYTE CARDS							
Basic Time Hardpack	116	97	31	18	12	29	23
iCard 20	115	97	10	19	10	28	22
CMS Drive Plus 21	113	93	11	19	11	28	22
Maynard Onboard 20	101	86	11	19	11	32	24
Standard Brand Flash Card-20	93	76	10	19	10	30	25
Express Systems 2060	72	65	10	18	10	26	20
Plus Development HardCard 20	60	44	17	27	10	32	17
10-MEGABYTE CARDS							
IBM PC-XT	114	95	12	12	12	30	23
Maynard Onboard 10	103	90	11	19	10	30	22

N.A.—Not applicable; uses nonstandard BIOS routines.

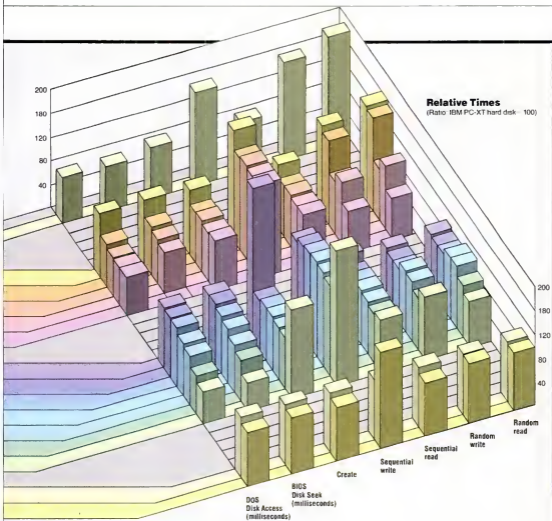
For file access routines, the Plus Development HardCard 20 took significantly longer to create a file than any other product reviewed, except for the 20-megabyte Basic Time Hardpack. Its sequential and random write times also were at or near the bottom of the pack. However, when considering the speed with which the Plus Development Hardcard completed the DOS Disk Access and BIOS Disk Seek tests along with its ease of installation and quality construction, it still comes in as one of the Editor's Choices.

The nonstandard BIOS routines used by the Standard Brand Flash Card-30 might never cause

a problem. But if your software library extends to programs like the expanded memory emulators that use a hard disk, the software just will not work.

Finally, the Express Systems 6060 stands out as a reliable hard card that will add 60 megabytes of cost-effective memory to your computer.

Whatever your choice of hard card, we strongly recommend that you protect your system by upgrading to a beeper (90- to 130-plus-watt) power supply if you currently have less than that.



**The DOS Disk Access** benchmark test measures the time it takes to do a random sector read using DOS. DOS buffers are set at 3 and the interleave factor is left at the driver's default setting. This test adds DOS's overhead to the BIOS and hardware's times. The test program performs the sector read 1,000 times within the DOS disk partition. The average result is shown in milliseconds.

The **BIOS Disk Seek** benchmark test measures the time it takes to do a random seek using the disk's ROM BIOS. The test result includes minimal software overhead and may not parallel the manufacturer's claimed average access time. The test program performs 1,000 seeks. The average result is shown in milliseconds.

The **File Access** benchmark test measures the time it takes to create and sequentially write a 256K-byte data file using record lengths of 512 bytes. The test program then performs a series of operations: a sequential overwrite, a sequential read of the same file, and a random overwrite and random read.

## ■ HARD DISK CARDS



The HardCard 20 performs well, with a fast average access time of just over 40 milliseconds.

ected by a good-looking (and electrically insulating) black plastic sheath.

Not counting its predecessor, the HardCard 20 is the thinnest hard disk card that's available: an authentic .8-inch-wide package, just the width of a single XT drive slot. Overall, the entire product looks good. Amazingly, it works well, too.

The proprietary control electronics are a masterful combination of high-tech ideas and processes. Much of the circuitry relies on tiny surface-mounted components and VLSI chips from NEC and Scientific Micro Systems. Despite its small size, the controller reads and writes 2,7 RLL to the tiny disk drive, giving it a capacity of just over 21 megabytes.

Most of the time the HardCard 20 is a

### ■ Plus shaved nearly 3 watts off the HardCard 20's power consumption—it draws 8 watts.

good performer, helped along by a fast (for hard disk cards) average access time of just over 40 milliseconds, its RLL data coding scheme, and an interleave factor of 3. However, in some of PC Labs tests, the HardCard 20 lagged noticeably, particularly when accessed through DOS.

The disk itself combines oxide-coated platters with an automatic park-and-lock mechanism for the read/write heads, which Plus calls "Airlock," to give the system shock resistance (and survivability) that more than meets the standards of the Compuq portable computers.

The HardCard 20 arrives with its low-level format already in place but requires DOS partitioning and formatting. The start-up process is helped along by an automatic installation program that first copies distribution software from the HardCard itself to a backup disk, then (using your own DOS disk) formats and partitions the

HardCard. In the process, the Plus installation program will modify some versions of DOS to create a new formatting utility to be used exclusively with the HardCard.

Only one jumper, if any, needs to be set. It determines whether the HardCard is drive C: or drive D:, so you can install it in an XT that already has a hard disk or install two HardCards in one system. The factory setting is for drive C:.

A small plus sign (+) to the upper right of the screen indicates drive activity, but it, as well as an audible activity indicator, can be switched off with a software command.

Plus Development has aimed the HardCard at the inexperienced user, and its attention to detail bears out this philosophy. The documentation is slick and clearly written, almost like an automobile owner's manual. Even a simple DOS front-end or shell is supplied to make navigating in the new hard disk territory easier.

## Standard Brand Flash Card-20 and Flash Card-30

Among the pretentious products whose producers paste labels over suppliers' brands and call them their own, the Standard Brand Flash Card-20 and Flash Card-30 stand out as refreshingly honest. These simple combinations of controller and little disk on a formed aluminum mounting bracket do nothing to hide their origins. The controllers are factory-standard Western Digital products; the 20-megabyte disk is a La Pine Technology Titan; the 30, a Miniscribe. The documentation fairly and accurately describes the entire system.

Both the hard disks reviewed are 20-megabyte units. The difference between the two Flash Cards is that the 30-megabyte unit uses RLL data coding to up its capacity and data transfer rate (to 7.5 MHz).

You'll find a few more subtle differences as well. The La Pine hard disk automatically parks and locks its read/write heads when it powers down. The Miniscribe does not do this but is better able to handle the rigors of RLL. The La Pine is good for 50 Gs of nonoperating shock, 10 while operating; the Miniscribe is good for 60 Gs nonoperating (after the heads have



### FACT FILE

#### Plus Development HardCard 20

Plus Development Corp.  
1778 McCarthy Blvd.  
Milpitas, CA 95035  
(408) 946-3700

List Price: \$895

Requires: DOS 2.0 or later.

**In Short:** A single-slot hard disk card with moderate performance and a high degree of refinement. The best choice for a novice.

CIRCLE 877 ON READER SERVICE CARD

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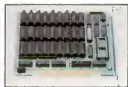
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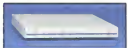
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## ■ HARD DISK CARDS



### FACT FILE

#### Standard Brand Flash Card-20

Standard Brand Products  
CompuAdd  
12303-G Technology Blvd.  
Austin, TX 78727  
(512) 250-1489  
List Price: \$429

**Requires:** DOS 2.0 or later. Recommend 256K RAM on motherboard for IBM PC; recommend power supply upgrade from 130 to 150 watts if installed with internal modem and 640K RAM on IBM PC; not recommended for Compaq computers made before 1985.

**In Short:** A plain 20-Mbyte hard disk card that requires one and a half slots and offers good value.

CIRCLE 676 ON READER SERVICE CARD

#### Standard Brand Flash Card-30

Standard Brand Products  
CompuAdd  
12303-G Technology Blvd.  
Austin, TX 78727  
(512) 250-1489  
List Price: \$495

**Requires:** DOS 2.0 or later. Recommend 256K RAM on motherboard for IBM PC; recommend power supply upgrade from 130 to 150 watts if installed with internal modem and 640K RAM on IBM PC; not recommended for Compaq computers made before 1985.

**In Short:** An elegantly simple RLL-based 30-Mbyte hard disk card that requires one and a half slots and offers good value.

CIRCLE 676 ON READER SERVICE CARD



The Flash Card-20 and Flash Card-30 have self-booting installation programs written on them. You need only boot from the new disk and put a DOS disk in drive A: to make them operational.

306 cylinders. The Flash Card-30, on the other hand, can accommodate only drives that are capable of handling RLL with four

heads and 612 or 615 cylinders.

Instructions are included for altering the jumpers on the Flash Card controllers to configure the hard disk on the card as either drive C: or D: (and an auxiliary drive, if any, with the other drive designation).

Both drives arrive low-level-formatted and have a special self-booting installation program already written on them. Making either system operational requires only booting from the new disk, then putting a DOS disk in drive A:. The drives use the standard DOS utilities FDISK and FORMAT under DOS 2.0 or later. A low-level-formatting and diagnostic program is included with either disk.

Despite (perhaps because of) its simplicity, the Flash Card-30 was one of the fastest units examined here. However, one amazingly fast test result—its 4.62-millisecond random seek time—is anomalous and does not reflect actual performance. Rather, it is a result of the product using nonstandard BIOS calls. The Flash Card-20 was slower but never embarrassing. Either product would be a good, honest addition to your PC.

Winn L. Rosch is a contributing editor of PC Magazine.



### EDITOR'S CHOICE

*The Plus Development HardCard 20 stands out as the best-made, most-polished product. Although some aspects of its performance falter, overall it rates as the most convenient to install and the product that's most frugal with the limited electrical supply of an ordinary PC. Of the products examined here, it would be our top choice if we didn't have to bother with such trifles as price tags.*

*For those more concerned with budgets than integration or finish, the Standard Brand Flash Card-20 and Flash Card-30 stand out as the best low-cost choices. They performed well and showed no glaring flaws in PC Labs benchmarks tests. We also like their straightforward and honest simplicity.*

been parked), 6 while operating.

Both systems require a slot and a half, the slot adjacent to the Flash Card (on the right) can be filled with a short card. Both systems require a direct connection for disk drive power (in addition to the PC bus connection for data and control). Both drives include a wye cable so that they can be plugged into systems without a free disk drive power connector. Both systems consume about 13 watts, near or above the limit of the capacity of an ordinary PC, depending on the other options that are installed in it. The Western Digital controller that each Flash Card uses is capable of operating up to two disk drives. The choice for an additional drive with the Flash Card-20 includes any 20-megabyte hard disk with four heads and 612 cylinders or any 10-megabyte drive with four heads and

# The me always the

-192K For all its pluses,  
networking has a minus.

-66K, -128K, -128K.  
A word of warning: Too many  
pop-ups can have a negative  
effect on your memory.



-320K Windowing can give you a whole new outlook.  
It can also gobble up a whole lot of memory.

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-128K. Everyone will tell you downloading is where it's at. Which is why expanded memory is where you should be.



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# MAKING CONNECTIONS

## Fox Research's 10-NET

**F**ox Research's 10-NET is an exception to the Chinese restaurant style of LAN design currently in vogue, in which you choose your networking software from column A and your adapter cards from column B. Instead, Fox Research offers a single package that contains everything you need to configure a single station in the flexible, feature-filled 10-NET network.

Each \$695 package, the size of two software binders, consists of two program disks, a half-length network interface card, a tap box, and a special 8-foot cable that connects the network interface card to the tap box. You buy one package for each workstation, regardless of the network's size.

Currently, the 10-NET hardware runs only on the 10-NET networking software.

While many network vendors make you pick and choose among interface cards or servers or networking software, 10-NET makes for one-stop shopping. Fox Research provides everything you need to equip a workstation in one easy-to-install package. The resulting network is chock-full of features, but is 10-NET fast enough to meet the needs of your application?

■ FRANK J. DERFLER, JR.

Fox Research has been demonstrating a NETBIOS-compatible version of 10-NET (which is compatible with such systems as the IBM Token-Ring Network) to big customers and dealers, saying it will be released "soon." We believe Fox Research will release this version when the firm can provide both NETBIOS compatibility and backward compatibility with the present 10-NET product line.

Unlike many other networks, 10-NET does not use a dedicated server. Instead, the 10-NET software, like IBM's *PC Local Area Network Program*, allows any workstation to contribute any or all of its resources, such as disk drives or printers, to the network. You can configure 10-NET workstations to optimize their network-sharing role beyond local computing, making

## ■ 10-NET

them, in effect, dedicated servers. However, these stations never lose some capability for local computing. For our benchmark tests, PC Labs configured an 8-MHz AT to act in this semidedicated server mode.

**EASY INSTALLATION** 10-NET's network interface card has few jumpers and comes ready to install into a standard PC. You must change only one jumper to use the card with a PC AT; however, no provision is made for using the AT's faster interrupts.

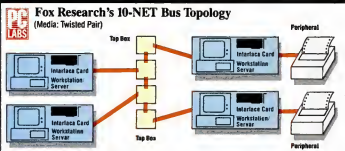
Every 10-NET card has an LED that blinks when the card is addressed by the networking software. This feature goes a long way toward answering the fundamental troubleshooting question, "Is the problem in the software or the hardware?"

Although 10-NET's basic installation package does not include wiring, 10-NET is one of the few networks that can use the most common form of twisted-pair telephone wiring, the 22-gauge JK cable used for house wiring. (Other networks that claim to use twisted pair, such as the IBM Token-Ring Network, impose technical limitations on the type of wiring and connectors you can use.) This wiring is low cost (only about 20 cents per foot) and easy to install, requiring a minimal amount of dexterity with a wire stripper and a screwdriver.

Home telephone wiring normally contains four conductors. Since 10-NET uses only two of these conductor wires, you could install 10-NET along with one active telephone line. In an office, 10-NET could ride any spare pair of telephone wires running in a direct path between the stations on the network.

Fox Research also provides various types of shielded twisted-pair wiring for "noisy" electrical locations (where there are motors, welding, and so on). In addition, Fox Research markets a fiber-optic link for use in installations with a great deal of RF noise or spread out over a great distance.

**CONNECTING THE PIECES** 10-NET connects workstations in a physical bus topology that can be up to 2,000 feet from end to end. A \$595 repeater can link 2,000-foot wire segments. Like 3Com Corp.'s Ethernet, Gateway Communica-



Everything you need to set up a node for the 10-NET network comes in a single kit that includes (1) the network interface board, (2) a tap box, (3) an 8-foot connecting cable, and (4) the 10-NET networking software. Not included in the kit is the twisted-pair wiring—the 22-gauge JK cable normally used for home telephones—necessary to connect the stations. All stations act simultaneously as workstations and servers, contributing resources such as disk drives or attached printers to the network.

Physically, 10-NET uses a bus topology. As with other networks using this topology, the ends of the network are terminated with resistors. However, 10-NET's terminating resistors are encased in the tap box. 10-NET uses the CSMA (carrier sense multiple access) media-sharing protocol with a collision-avoidance routine to prevent workstations from transmitting packets simultaneously.



tions' G/NET, and other bus systems, the 10-NET bus must be terminated at each end with a resistor. 10-NET's terminating resistor is an inexpensive electronic component contained in the tap box, rather than the chrome-plated "silver bullet" used in Ethernet. The Ethernet silver bullet gets its nickname not only because of its shape and color, but also because its price seems to make it worth its weight in silver. The 10-NET approach is much more economical.

Tap boxes connect the trunk of the bus to *stubs*, or 8-foot-long cables that run to each workstation. The tap boxes eliminate the messy wiring typical of present-day LANs. The final installation looks a lot like a telephone hookup with a wire and connector going from the PC to the tap box on the wall. You can buy extra tap boxes and install them to prepare for future expansion or to meet the needs of offices that frequently play musical desks. These extra tap boxes don't cause the network's speed to degrade and allow easy movement of workstations.

Electrically, as well as physically, 10-NET is a bus. Unlike an electrical ring, all 10-NET stations have simultaneous access

■ 10-NET is one of the few networks that can use the most common form of twisted-pair telephone wiring, the low-cost 22-gauge JK cable used for house wiring.

to the network. 10-NET's network adapter cards use the CSMA (carrier sense multiple access) protocol to share the media. To prevent data loss as a result of signals colliding, the 10-NET software provides a collision-avoidance routine.

10-NET's method of formatting packets and transmitting on the network media is almost identical to that used by Ethernet and, in fact, each 10-NET card is identified by an Ethernet address. 10-NET is also similar to AT&T's StarLAN, which uses a transmission technique similar to Ethernet's. (However, because 10-NET is currently a two-wire system, while StarLAN uses four wires, 10-NET is a slower system.)

**10-NET SOFTWARE** The 10-NET software, a DOS-based system that recognizes DOS 3.1 file and record locking, is one of the most economical and full-featured networking software packages on the market. It comes standard with features such as electronic mail, public calendar, bulletin board, communications programs, print spooling, and management reporting programs that are either optional or unavailable on other networks.

Included in the installation package are the main network program used on every workstation and several utility programs for communications and administration. The main 10-NET program loads and remains in the RAM of every station on the network, reserving about 100 bytes of memory. This loss of available memory can limit you if you want to load big

spreadsheets or memory-resident programs and use the network at the same time. However, the program is easy to kill if you need to free up memory, and, unlike systems such as the IBM Token-Ring Network, you can reenter the network almost as fast as the network program file can be read into RAM.

As is typical of most PC-based networks, making and maintaining batch files is a large part of a 10-NET network administrator's job. You must use batch files to enable workstations to log on to the network, to specify users' security privileges, and to help users donate and access network resources.

To install 10-NET, you must write a short (as little as three lines) batch file that defines a unique user name and node name for each person and workstation on the network. Although there are no special requirements for the structure of names, they should be memorable and descriptive. Users can log on to the network at any workstation with their user name and use all of their network privileges.

Although a user can log on to the network from any station, the network administrator must write a specially tailored profile file for each workstation's boot disk or hard disk. The profile file both contains the network privileges of the station's normal user and specifies which resources the workstation will share with the network. This technique is different from the common practice of putting a user's profile on the server's hard disk and is less convenient for the network administrator than having access to all files from one point. But this distributed approach is appropriate for a true resource-sharing network like 10-NET that needs no dedicated centralized server.

**MENUS AND COMMANDS** A series of easily accessed menus or commands (entered directly or through batch files) makes 10-NET easy to use. The menus appear at the bottom of the screen and prompt selections of special function keys. Since most of 10-NET's menus are RAM resident, you can pop them in anytime over any application.

Originally, 10-NET used a series of commands such as Mount (gain access to a shared resource) that were borrowed from



## FACT FILE

### 10-NET, Version 3.1

Fox Research Inc.  
7016 Corporate Way  
Dayton, OH 45459  
(513) 433-2238

**Workstation Requirements:** 192K RAM, one floppy disk drive, DOS 2.0 or later.

**Networking Software:** 10-NET.

**Prices:** 10-NET installation package (includes network interface board, tap box, 8-foot connecting cable, networking software, documentation), \$695; twisted-pair telephone wiring, \$120 per 1,000-foot roll.

**In Short:** 10-NET includes everything you need for a workstation node in a single package. The 10-NET software includes features such as a public calendar and chat capabilities that are optional or nonexistent on other networking software packages. This is a good package for office or university environments that require such software features. However, the network's slow speed makes it inappropriate for DBMS applications that need fast transaction processing.

CIRCLE 104 ON READER SERVICE CARD

# The Name vs.



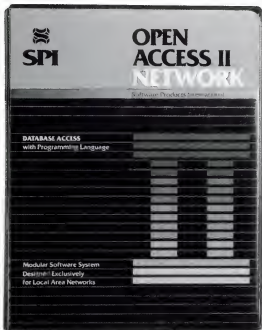
There is no other database management system that comes close to the total networkability of Open Access II Network. And that includes dBase III Plus.

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# The Network



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## 10-NET: Summary of Features

PRODUCT/ Manufacturer/ Software	Installation			Network Administration				Features				Compatibility		
	Turnkey	Menu-driven	Documentation	Hours per month	Status reporting	Security	Workstation operation	Station-to-station file transfer	Printer spooling/printing	Peer-to-peer communications	Network dial-in	RAM-resident software	Smart software	OS/2 III Plus
<b>10-NET</b> Fox Research Inc. 10-NET	●	■	■	75	■	■	■	●	■	■	●	●	●	●
<b>NETWARE/S-NET</b> Novell Inc. Advanced NetWare 68	○	■	■	100	■	■	■	○	■	■	●	●	●	●
<b>PC ARCNET</b> Novell Microsystems Corp. Advanced NetWare/286	○	■	■	1.25	■	■	■	○	■	■	●	●	●	●

—Indicates Editor's Choice    ● —Yes    ○ —No  
 ■ —Excellent    ■ —Good    ■ —Fair    ■ —Poor

The features of network systems are determined largely by the networking software. For an in-depth description of the method we used to evaluate each feature, see "Making Connections: LANs Under NetWare" (PC Magazine, Volume 9, Number 21). Fox Research's 10-NET offers many features while retaining ease of use and installation. Its security and station-to-station communications features are particularly strong, as is its status reporting. The installation process is not complex, but it requires you to create batch files for every user and workstation on the network. Although 10-NET's written documentation is not as good as Novell's, Fox does provide excellent support and training.

mainframe systems. The latest 10-NET release also allows you to access some functions using command names from several other LAN programs. For example, you can still type in Mount to access a shared resource or you could use the more common command name Net Use borrowed from the *PC Local Area Network Program*. This was an enlightened move that simplifies network training and operation in a multivendor environment.

**SECURITY** 10-NET's security capabilities are strong and flexible. Each station contributing resources to the network, such as a disk drive or printer, can restrict the network's use. Access control can be as loose or restrictive as you wish. You can assign security "levels" to each network user, to drives, or to directories on a drive. You can even assign security levels for writing to or reading each file. This ability to restrict access to individual files is unique among LANs (although common in minicomputer systems). In most instances, the files requiring security would be placed on one shared hard disk while all other resources are left available for free access.

To gain access to a file or device, a user must have a security level equal to or higher than the one assigned to that file or device. Workstations configured primarily to act as network servers must gain access to their own networked resources through the network access system. This maintains control over security even if someone gains physical access to the machine.

**FEATURES AND UTILITIES** The 10-NET networking software has more standard features and utilities than that of any LAN we've seen. It includes features and utilities for printer sharing, diagnostics, electronic mail, and station-to-station communications. Some features, such as station-to-station communications and diagnostics, are available from the RAM-resident menus. Other utilities, such as electronic mail, must be called up as an applications program.

In a network with distributed resources, good station-to-station communications are essential. You must be able to send a quick message to the person next to the letter-quality printer to ask if letterhead paper is loaded, or to the person with a hard disk to see if a file is current. We refer to this as

"rude messaging" because the messages interrupt you in the middle of your work. 10-NET has an excellent rude messaging, or chat, capability that is easy to use and to lock out.

CB is 10-NET's unique station-to-station communications capability. Like the popular CB service on the CompuServe information utility, CB works like a conference call, allowing several network users to engage in public discussions.

Tallys, Netstat, and Netlog are three 10-NET features that other network vendors would be smart to emulate. Tallys gives an immediate report on eight technical network parameters such as the number of packets sent, received, and acknowledged, full buffers, collisions, bad packets, and statistical errors. Netstat describes the resources and utilities available to any user on the network. Netlog gives an audit trail of the major actions taken by specific users on a network superstation; it is a valuable tool for network optimization and management.

The 10Spool utility intercepts and holds printing jobs until the specified printer is ready. Several screens give the status of the jobs in the spool. Unfortunately, unlike

- New Version 3.0 with
- New Network Commands
- NETBIOS Support

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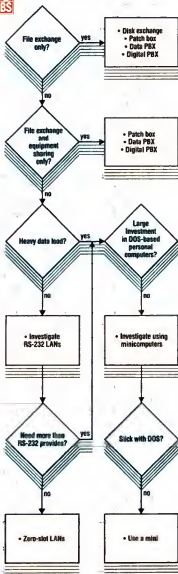
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Compatibility	• IBM PC, PC XT, PC AT and compatibles; Apple II and III series Personal Computers	• IBM PC, PC XT, PC AT and compatibles; Apple II and III series Personal Computers
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Interfaces	• Any combination of parallel or serial input and output	• Parallel Interface - 36 pin Centronics, Serial Interface - 25 pin RS-232C
Status LEDs	• Reset, Error, Pause, Ready, Copy	• Reset, Error, Pause, Ready, Copy
Copy Feature	• Allows for up to 255 copies of same document	• Allows for multiple copies of the same document
Pause Feature	• Allows for single sheet printing with documents containing ASCII form feeds	• Allows for single sheet printing with documents containing ASCII form feeds
Bypass Feature	• Allows for straight through computer-to-printer printing	
Handshaking	• ETX/ACK, TRCP/RTS/CTS, DTR/DSR and Xon/Xoff	• RTS/CTS, and Xon/Xoff DTR/DSR
baud Rates	• 150, 300, 600, 1200, 2400, 3600, 4800, 9600, 19.2K	• 150, 300, 600, 1200, 2400, 3600, 4800, 9600, 19.2K



## The Connectivity Decision Guide



This chart is designed to help you select from among the many information-transfer and resource-sharing alternatives. As you can see on the chart, if all you really need to do is exchange files or share printers, then you should consider devices such as PBXs and patch boxes. If your organization has not already invested heavily in PCs or DOS programs, then a minicomputer might meet your needs more economically. But if you want many users to share data files simultaneously under DOS, a LAN may be the best alternative. Once you've decided on a LAN, the need for station-to-station resource sharing and other factors

will influence your network purchasing decision.

Because manufacturers include many different features in their networks, some products will not fit neatly into one decision box in this guide. You'll also find that the lack of differentiation between LANs is becoming as large a problem in the LAN industry as the lack of standards was 2 years ago. But overlapping features and technical similarity between networks are good news for potential buyers. They will let you concentrate on more-traditional factors such as dealer support and price instead of on more-technical considerations.

Reviews originally appeared in *PC Magazine*:

• Vol. 5 No. 21 • Vol. 5 No. 22 • Vol. 6 No. 1 • Vol. 6 No. 2

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with *Advanced NetWare*, you must remember to issue the 10-NET software a command to close the spool before you can send a job on its way to the printer. A particularly nice feature is that the spool program sends a message telling you when your printing job is complete. In addition, you can tell 10Spool to send you a message when the job is ready for printing—so that you could, for example, adjust the paper.

**COMPLEX SPOOLING** In a distributed network, printer spooling is more complex because the spool is stored on the machine hosting the shared printer. Since the spool takes up a great deal of memory, the host machine should have a hard disk drive that's available to the network.

10Mail is a store-and-forward electronic mail system that runs on each individual PC but stores messages on a single shared hard disk. One of the simplest mail systems to use that we have seen, 10Mail's command line menu prompts you in using the special function keys. You can create text using the built-in text editor (with overwrite, insert, and full-screen cursor movement) or transmit a text file made with a word processor without adding any special formatting to the document. Our only complaint is that the mail system does not allow you to answer a message, without going back to the menu and selecting the send-mail function.

10News is a simple electronic bulletin board that the network administrator would normally use to announce completed or proposed changes to the system. However, anyone on the network can use it for any type of announcement.

A much-demanded but infrequently provided utility on a network is a calendar system for scheduling meetings. 10-NET provides such a calendar system in which each user indicates free or busy periods on a public calendar. Anyone with access to the system can find a common free time and enter an appointment. When you enter the proposed meeting time, the calendar will return the names of everyone on the network who is free at that time.

In addition, Fox Research offers an optional (\$595) hardware and software module that connects to a large LAN and reports problems such as high-resistance connections, poor terminations, and bad



## Benchmark Tests: 10-NET

The Network Speed Under Contention Test measures the impact of cache memory and other speed-enhancing techniques. 10-NET's times were very slow because the network doesn't cache. Because the Network plus Server Cruncher Test expands the test activities to include disk actions in addition to caching, most networks are slower on this test. 10-NET's times for the Network plus Server Cruncher Test, however, are faster than those for the Network Speed Under Contention Test. The reason is that 10-NET reads only short 1-byte chunks of data in the batch files and the Network Speed Under Contention Test contains longer (though simpler) batch files than the Network plus Server Cruncher Test.

The Smart Applications Test tests file and record locking and reads records in shared files. Because caching speeds up read actions, networks that cache do much better than 10-NET on this test.

Because file transfers across the network and spooled printing jobs are unaffected by the factors that slowed 10-NET in our benchmark tests, 10-NET provides adequate performance for most office and university applications. But its slow response times make it the slowest network tested for multiuser DBMS applications.

### Network Speed Under Contention Test

Interface card	Software	Server	Performance Times (Times given in seconds and decimal seconds)				
			Zero stations	One station	Two stations	Three stations	Four stations

10-NET	10-NET	All workstations	82.44	150.32	223.43	295.22	392.33
--------	--------	------------------	-------	--------	--------	--------	--------

NetWare 5-Net	Advanced NetWare 5.0	Novell Server 688	71.00	83.70	94.29	103.71	115.68
ARCnet	Advanced NetWare 2.86	8-MHz IBM PC AT	59.45	62.14	67.53	78.21	92.56

### Network plus Server Cruncher Test

Interface card	Software	Server	Performance Times (Times given in seconds and decimal seconds)				
			Zero stations	One station	Two stations	Three stations	Four stations

10-NET	10-NET	All workstations	82.44	122.59	200.01	274.18	364.24
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NetWare 5-Net	Advanced NetWare 5.0	Novell Server 688	71.00	73.05	79.45	86.87	91.00
ARCnet	Advanced NetWare 2.86	8-MHz IBM PC AT	59.45	65.85	73.87	110.55	129.63

### Smart Applications Test

Interface card	Software	Server	Performance Times (Times given in seconds and decimal seconds)				
			Zero stations	One station	Two stations	Three stations	Four stations

10-NET	10-NET	All workstations	61.00	101.00	118.00	164.00	197.00
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NetWare 5-Net	Advanced NetWare 5.0	Novell Server 688	61.00	61.00	62.00	63.00	64.00
ARCnet	Advanced NetWare 2.86	8-MHz IBM PC AT	47.00	49.50	49.50	50.50	50.50

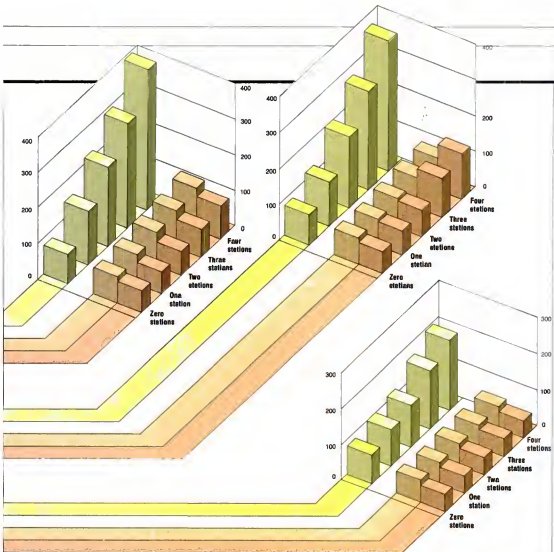
PC Labs tested Fox Research's 10-NET system, which includes 10-NET interface cards, 10-NET networking software, and workstations that also act as servers for shared resources on the network. Although 10-NET does not allow for dedicated servers, it does allow you to configure workstations in such a way as to optimize their network-sharing role over their local computing functions. We tested 10-NET with an 8-MHz IBM PC AT in this optimized server mode.

For easy comparison we have included test results for high performer Novell's NetWare 5-Net and the Editor's Choice, Standard Microsystems' APCnet, both of which were reviewed in "Making Connections: LANs Under NetWare," PC Magazine, Volume 5 Number 21. We tested both of these products running under Novell's Advanced NetWare and we configured the servers to operate

in the dedicated mode and not as dual-purpose server/workstations.

All benchmark tests were run using a network of three IBM PCs, one IBM PC AT, and one IBM PC-XT as workstations. All networking software was installed using the default configurations. No attempt was made to "fine-tune" the buffers or other parameters to achieve better performance in any one test.

For both the Network Speed Under Contention and Network plus Server Cruncher benchmark tests, the dependent variable is the time it took for the IBM PC-XT on a LAN to perform a standard test of DOS read-write commands against a single data file residing in the server. The independent variable was the network load. We began with the heaviest load, four network workstations running DOS batch



files, asking for constant reads of data files from the server. Then we decreased the number of workstations one by one to reduce the network load.

The three-dimensional chart above shows the time it took the XT to perform the test under the varying network load on each network. For comparison, we give the time it took to run the same test on the XT's internal hard disk (Zero stations).

The difference between the Network Speed Under Contention Test and the Network plus Server Cruncher Test lay in the size of the data blocks that the workstations moved over the network.

The Network Speed Under Contention Test exercises the network when the network interface cards and the media are heavily loaded. We attempted to eliminate the factor of server disk access time from this test by loading the network with data blocks small enough to reside in the server's cache mem-

ory on most systems. In addition, we varied the size of the data files to detect any cache limits.

The Network plus Server Cruncher Test heavily loads the network interface cards, the media, and the server's disk drive access system. In this case we used data blocks of various sizes, some small, some large, when we loaded the network in order to exercise the hard disk drive access system. The results are influenced by hard disk performance and the efficiency of the networking software as it moves data on the disk and between the disk and the network interface cards.

During both of these tests, we used a hardware clock residing on an AST SixPak card in the XT to determine the starting and ending times. We did not use the system clock because its operation can be disturbed by some network functions.

The Smart series of integrated networked programs from Innovative Software gave us a practical way to evaluate networks under the load of typical applications. In fact, viewed on a system monitoring screen, such as NetWare's, the Smart Applications benchmark test looks and acts like a busy office, because the level of activity varies between intense use of the network and quiet periods when processing takes place.

For the dependent variable plotted on the three-dimensional chart, we used an IBM PC-XT operating Innovative Software's Smart DBMS running a script file that indexed and sorted shared database records. The independent variable was one through four workstations running another script from Innovative Software that created bursts of activity interspersed with periods of silence.

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# frame Isn't his Easy.

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## ■ 10-NET

interface cards. This is another troubleshooting plus. Other options include a 3270 SNA Gateway and an RS-232C interface that enable remote PCs to dial into the network via modem and have the full capability of a network workstation. These features and utilities make 10-NET more than an information-transfer pipe. They give it potential to be a productivity tool.

Fox Research provides good support for 10-NET. Free company-sponsored training courses are available in major cities, and you can call a free hot-line service. An excellent \$105 slide and audio-tape package is available for in-house training.

**10-NET PERFORMANCE** Although the 10-NET software offers many excellent features, the network did not score well in our benchmark tests. Although for the most part the software design accounts for the relatively slow benchmark-test times, the design of our benchmark tests

### ■ 10-NET's features and utilities make it more than an information-transfer pipe.

also accounts for part of the slowness.

Our benchmark tests attempt to measure network response time, which is the total time it takes for the network to perform standard tasks under varying loads. We measure the time that elapses between the entering of a command and the response on the screen. Response time is what counts for most users.

Of the several software techniques that improve response time, the most common

is caching, in which frequently used blocks of data are stored in solid-state memory (RAM) somewhere in the network. Some networking software packages, such as Novell's *NetWare*, use a cache on the network server. Others, such as the IBM Token-Ring Network, store blocks of data in workstation RAM. Caching improves response time by eliminating the relatively slow action of the hard disk.

However, 10-NET does not cache, probably because of its distributed networking concept. Instead, it answers every request for data with a fresh read. Caching in a distributed system is difficult because you don't know where the next request for data is coming from. In part, it is also probably a carryover from the days when RAM was limited.

The design of the Netspeed and Netcruncher tests interacts with 10-NET's design in a manner that slows the benchmark-test results even more. Our tests ex-

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exercise the lowest common denominator of software: DOS batch files. The designers of 10-NET did not envision anyone reading 15K-byte batch files like ours across the network. Since batch files are usually small, 10-NET sends them across the network a byte at a time. As a result, the 10-NET software spends considerably more time reading the benchmark-test batch files than other networks.

Finally, since 10-NET's software design concept allows for network service while retaining local processing, the full power of the server's processor cannot be given to the network. The trade-off is that the "server" machine remains available for some simple local processing tasks. To make matters slower, the 10-NET software uses few speed-enhancing techniques.

**BOTTOMLINE** If your network is used in an office in which most actions are file transfers, printer sharing, and occasional

■ **10-NET does not cache.**  
Instead, it answers  
every request for data  
with a fresh read.


access to an IBM-style mainframe, we recommend 10-NET highly. The marketplace seems to agree. Fox Research has sold about 50,000 units in the United States and in Europe since the first 10-NET node was delivered in early 1984. It is perfectly suited for office or classroom applications. If you need a network for an application such as conducting multiple communications sessions through a network gateway, on-line inventory control, large reservation

services, or other intensive interactive work on a shared DBMS, we believe that you would be better off with a heavy-duty network from Novell or Tallgrass Technologies, or perhaps investing in a centralized minicomputer.

We will keep the combination of Novell's *Advanced NetWare/286* and Standard Microsystems Corp.'s ARCnet as our Editor's Choice LAN for interactive operations. We like its flexibility, security, and speed. *Advanced NetWare/286* and ARCnet can do everything, including carrying the heaviest data load. But we highly recommend Fox Research's 10-NET for office and educational applications not requiring heavy transaction processing. Its long list of standard features, support, and value make it invaluable for everything but heavy-duty information transfer. ☐

*Frank J. Derfler, Jr., is a contributing editor of PC Magazine.*

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CIRCLE 317 ON READER SERVICE CARD

# AT ALTERNATIVES: EXTRA FEATURES— AND CHEAPER, TOO

*Some surprising features keep us interested in continuing to look at low-cost AT compatibles. The collective power and prowess of the proliferating AT clones keep IBM's prices for its PCs lower. Here's a look at nine more.*

---

Eight low-cost AT compatibles passed through PC Labs and were reviewed in *PC Magazine* as recently as last October (see "The Cheapest ATs Ever," Volume 5 Number 18). In this issue we review nine more that the Labs just examined.

What keeps us interested in these machines when we've seen so many that are so similar? It's certainly not the little square logos on the front panels, which are often the only noticeable differences among these machines. For instance, a computer called the QIC 286-AT looked strikingly similar, both inside and out, to the Club AT, a computer we reviewed in October. When we called and asked if QIC knew about the Club AT, the manufacturer responded: "QIC is Club AT's parent company."

So what keeps us interested? It's the little extras that some of the compatibles offer. Many run at faster speeds than the IBM PC AT, but often the rewards are more subtle. For example, when we opened the PC Designs ET-286i, we got a real surprise. In the RAM area of the system board, the standard 256K-bit chips were mounted in oversize sockets meant for 1-megabit RAM chips. This compatible is the first one we've seen with that forward-looking feature. Little surprises like

that one keep us going and make each computer we review a new adventure.

Collectively, the several dozen PC AT compatibles, ranging from the well-known \$1,495 PC's Limited AT (see "Power Computing: Alternatives to the IBM PC AT," Volume 5 Number 8) to the lesser-known mail-order units, some of uncertain offshore heritage, help keep IBM honest. Every time IBM knocks several hundred dollars off the list prices of its PCs, it's an unspoken tribute to the collective power and prowess of the compatibles.

—Joe Desposito.

## Victor V286

Sometimes the only way to distinguish one AT compatible from another is by the logo. The Victor Technologies V286, however, not only looks different from the rest but also offers a few features not often found on most AT compatibles.

The base price for a V286 with a single floppy disk drive is \$2,195. The unit we reviewed had a very complete configuration, including a 40-megabyte hard disk drive, a 1.2-megabyte floppy disk drive, and a CGA adapter and monitor, and it is priced at \$4,095.

The cream-colored V286 is about the same size as the IBM PC AT, but its exteri-

## ■ LOW-COST AT COMPATIBLES

or design is different (more pleasing, I think). Some features you'll notice from the outside are a reset button on a lower recessed panel at the front of the machine and an RS-232 port, a parallel port, and a speed switch (6- or 8-MHz) at the rear. All connectors are labeled, some with icons. The keyboard connector, for example, has a tiny keyboard pictured above it.

To open the case, you remove two screws from each side of the computer and lift the top cover straight up and off. Inside, the quality of construction of the V286 is exceptional. Unlike other compatibles, or even the IBM PC AT, the chassis has metal sides more than an inch high and a rear panel that overlaps the power supply.

The system board includes the serial and parallel ports and also a floppy disk drive controller. Two of the four banks of RAM are soldered, and two are socketed, for a total capacity of 1024K bytes. The board itself is about 33 percent larger than IBM's.

The Victor keyboard has the same layout as the old IBM PC AT's. The keys have a constant resistance to the touch, which I found acceptable for typing.

The CGA monitor that Victor sells with the system has a fine display. Its colors are vibrant and true, and its focus and clarity are first-rate. A switch on the monitor lets you change from color to green on black. The only problem with the monitor is that the brightness control at the rear has to be turned all the way up. A nice ergonomic feature is the tilt-and-swivel base.

The hard disk included with the review system was a high-performance



*The Victor V286 has some features not found in the IBM AT or other compatibles, like a chassis with metal sides more than an inch high and a rear panel that overlaps the power supply. Other features are an RS-232 port, a parallel port, and a speed switch (6- or 8-MHz) at the rear.*

(38-millisecond) Seagate 4051 drive. Since the size of the disk drive was larger than the 32-megabyte DOS limit, special software was needed to format the drive. Victor provided a product called *AT Speedstore* for this purpose. The software was fairly simple to use, so setting up the disk presented no problems.

The V286's performance on the PC Labs benchmark tests was on par with the 8-MHz IBM PC AT's performance. With the Victor, however, you can select either 6- or 8-MHz operation with the slide switch at the rear of the machine. You can change speeds at any time, even while running a program.

I'd choose the Victor V286 base system over the configured system for its flexibility. To this reasonably priced system you can add any type of hard disk, display adapter, and monitor. Although Victor's color monitor is a good one, the company currently doesn't offer an EGA adapter or monitor. —Joe Deposito

### PC Designs ET-286i

The PC Designs' ET-286i sounds like a cross between a little person from outer space and a BMW. It's actually one of the better AT compatibles evaluated here. Its price is high, but the ET-286i is one of the

few systems we received that could be taken out of the box and used as is.

PC Designs formerly sold its systems as kits to allow us to have fun putting them together. Now they come fully assembled. The base system includes 1 megabyte of RAM on the motherboard, a single 1.2-megabyte floppy disk drive, a good Max-iswitch keyboard, a Princeton Graphics Max-12 monochrome monitor, and a Hercules-compatible monitor card. There is not as much standard disk storage as you may want, but everything else, including an extra parallel port and two serial ports, is part of the base system.

The memory chip sockets on the motherboard were different. I have not seen an other system that was capable of handling 1-megabit dynamic RAMs. The other systems we looked at could handle 64K- or 256K-bit chips, but that limited the total motherboard memory to 1 megabyte. PC Designs included this type of motherboard in the machine to allow up to 4 megabytes of RAM for Xenix, UNIX, and other multi-user operating systems (but not expanded memory unless you use a program like *V-EMM* to emulate an Intel Above Board). This great capability also allows you to have large amounts of memory without restricting your motherboard memory to make your expansion memory card work.



### FACT FILE

#### Victor V286

Victor Technologies Inc.  
380 El Pueblo Rd.  
Scotts Valley, CA 95066  
(800) 248-5252  
(408) 438-6680

List Price: \$4,095 (tested configuration)  
In Short: A quality 6- or 8-MHz AT with some nice extras but a higher price than most of its competitors.

CIRCLE 68 ON READER SERVICE CARD

## ■ LOW-COST AT COMPATIBLES



### FACT FILE

#### PC Designs ET-286i

PC Designs Inc.  
5837 S. Garnett  
Tulsa, OK 74146  
(800) 522-8088  
(918) 252-5550

#### List Price: \$3,145 (tested configuration)

**In Short:** A machine for users who want to run Xenix, UNIX, or other multiuser operating systems. The price may be a little high, but the base configuration can be used as is. The motherboard is socketed to accept 4 Mbytes of RAM.

CIRCLE 864 ON READER SERVICE CARD

The documentation was good, but some of it was not needed. The first half of the manual was a good description of how to put the kit together, but since the kit had been put together by PC Designs, it was unnecessary. The rest of the documentation gave a good description of how to set the options and what was in the ROM BIOS.

Most of the options (except the amount of memory in the machine) are set by moving jumpers on the motherboard. I found all the jumpers, except the one I would

want to change, easy to get to. The one jumper I wanted access to (for the number of wait states) was under the cage for the disk drives. Except for that one problem, everything, including the 80287 socket, was within easy reach.

Fortunately, the turbo-mode/normal-mode option was changed from the keyboard and not inside the machine as it was in some of the other systems I evaluated. The only disturbing aspect of this option was that it used the Ctrl-Shift-Alt-Del key combination. I would not want to switch to turbo mode in the middle of an application and forget to press the Shift key.

I used a very good old-AT-style keyboard from Maxiswitch for the evaluation. By the time you read this, PC Designs will be shipping a new-AT-style keyboard.

PC Designs has a separate, toll-free phone number for support, which should be helpful to most people who buy these machines. Most of the vendors of the AT compatibles evaluated either do not have a toll-free number or use it for all their incoming calls. Someone else in PC Labs mentioned that the support number was probably always busy. Maybe so, but I did not have a problem.

The PC Labs tests with the Intel Above Board ran fine with this machine and I ap-

preciated the ability to set the limit on conventional memory at 256K, 512K, or 640K bytes or at 1 megabyte through switches on the motherboard. One disturbing aspect of the memory test was evident in all the AT compatibles I evaluated. None of them seem to be able to run extended memory as fast as the IBM 8-MHz AT, and that could slightly slow down access to a RAMdisk held in extended memory. —Charles Teets

## ARC 286 Turbo

The ARC 286 Turbo, from American Research Corp., is a well-built system that shows some concern on the vendor's part for the kind of quality that makes users comfortable. The sturdy case can be re-

■ The ARC 286 Turbo shows the vendor's concern for quality: all the cables came neatly fastened with tie wraps.

moved and replaced easily, and all the cables came neatly folded and fastened with tie wraps.

Inside the ARC 286 Turbo, some of the options, such as normal or turbo mode, 640K bytes or 1 megabyte of RAM, and monochrome or color monitor, are selected through jumpers on the motherboard. These jumpers can be changed only by using a pair of needlenose pliers or very small hands. I would rather see options accessed through an easily accessible switch block or, better yet, held in CMOS RAM that you could set through the Setup utility.

Although the system was well configured, it was just a little short on memory. The vendor had intended to send a system with 1 megabyte of RAM but instead sent us one with only 512K bytes. The basic system configuration does not come with a monitor, monitor controller, or hard disk drive, but the evaluation machine



The memory chip sockets on the PC Designs ET-286i's motherboard are capable of handling 1 megabit of dynamic RAMs. This type of motherboard allows up to 4 megabytes of RAM for Xenix, UNIX, and other multiuser operating systems.

## ■ LOW-COST AT COMPATIBLES

we received had all these options, as well as a second 1.2-megabyte floppy disk drive.

The keyboard is an old-AT-style model made in Taiwan. The layout and feel of the keys are acceptable but not as good as I have seen on other machines. According to the documentation, you can use a two-key combination on the keyboard as a reset button. However, that option works only on American Research's XT-compatible machine. An ARC spokesperson says that you could use special software to implement the reset key combination on the 286

■ Inside the ARC 286 Turbo, some options, such as normal or turbo mode, or 640K bytes or 1 megabyte of RAM, are selected through jumpers on the motherboard.

Turbo, but that option would not be any different from using the Ctrl-Alt-Del method of warm booting.

The ARC 286 Turbo performed well in the PC Labs tests, but the zero-wait-state turbo mode caused some problems with the Intel PS/AT Above Board. When I tried to write to the extended memory on the Above Board, several different fatal errors occurred. I also had trouble getting the Above Board to backfill the 512K bytes of RAM to 640K bytes. The vendor's support staff is trying to work out these problems. The Above Board worked well as long as I was not in turbo mode (8 MHz) and as long as I did not try to backfill my base memory to 640K bytes, but on the PC Labs benchmark extended memory test, the ARC 286 Turbo ran half as fast as the IBM 8-MHz AT did.

American Research sent its optional monochrome monitor and Hercules-compatible graphics controller, as well as a NEC MultiSync monitor with an EGA



## Benchmark Tests: Low-Cost AT Compatibles

**A**t 16 MHz, the QSP Supermicro 286 and CompuAdd Standard-286 II have the fastest times in three of the processor/memory tests (8086 Instruction Mix, Floating-Point Calculation, and Conventional Memory) because of no-wait-state memory. In the 8-MHz and 10-MHz category, the PC Designs ET-286i and Multitech Accel 900 are fastest in the NOP test because of their 10-MHz operation. The QSP Supermicro 286, CompuAdd Standard-286 II, and Maxum-286 Turbo are faster than the other 8-MHz computers in the 8086 Instruction Mix, Floating-Point Calculation, and Conventional Memory benchmark tests because of their zero wait-state memory.

### Performance Times

(Times given in seconds and decimal seconds, except where noted)

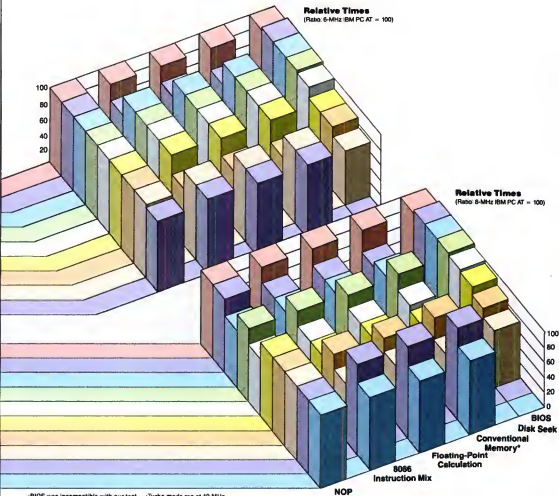
Product (8 MHz)	NOP	8086 Instruction Mix	Floating-Point Calculation	Conventional Memory*	BIOS Disk Seek (milliseconds)
8-MHz IBM PC AT	5.6	12.0	48	1.8	37
QSP Supermicro 286	5.6	9.6	36	1.3	30
PC Designs ET-286i	5.6	12.3	48	1.8	38
Vicler V286	5.6	12.3	48	1.8	38
Multitech Accel 900	5.6	12.3	48	1.8	37
ARC 286 Turbo	5.6	12.3	48	1.8	33
CompuAdd Standard-286 II	5.6	9.6	36	1.3	33
Maxum-286 Turbo	5.6	12.8	49	1.8	26
Kamerman Labs TCS-7000	5.3	12.4	48	1.8	†

Product (8 MHz)	NOP	8086 Instruction Mix	Floating-Point Calculation	Conventional Memory*	BIOS Disk Seek (milliseconds)
8-MHz IBM PC AT	4.2	9.0	36	1.3	37
QSP Supermicro 286	4.2	7.1	26	0.9	38
PC Designs ET-286i <sup>1</sup>	3.4	7.0	28	1.0	38
Vicler V286	4.2	8.8	35	1.3	38
Multitech Accel 900 <sup>1</sup>	3.4	7.2	26	1.0	37
CompuAdd Standard-286 II	4.2	7.1	26	0.8	36
ARC 286 Turbo	4.2	8.0	35	1.3	33
Maxum-286 Turbo	4.2	7.2	29	0.8	26
Maxum-286	4.2	11.0	45	1.6	†
Kamerman Labs TCS-7000	4.3	9.0	35	1.3	†

\*Results for the Conventional Memory test are an average of the Read and Write times.

The NOP benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in microprocessors and the effect of memory caching. This test executes almost nothing but NOP ("No Operation") machine code instructions in a big 128K loop.

The 8086 Instruction Mix benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 8086 instruction code. These instructions are a subset of the total processor instruction set.



The **Floating-Point Calculation** benchmark test measures processor speed by looping through a series of floating-point calculations, including multiplication, division, exponentials, and logarithmic and trigonometric functions. The benchmark program uses the floating-point library included with the Microsoft C Compiler 4.0.

The **Conventional Memory** benchmark test allocates 256K bytes of conventional memory and treats it as a series of 64-byte records. Then, 16,384 random records are read into and written from this memory.

The **BIOS Disk Seek** benchmark test measures the time it takes to do a random seek using the disk's ROM BIOS. The test result includes minimal software overhead and may not parallel the manufacturer's claimed average access time. The test program performs 1,000 seeks. The average result is shown in milliseconds.

## ■ LOW-COST AT COMPATIBLES



*The ARC 286 Turbo's basic system is not configured with a monitor or monitor controller, but both its optional monochrome monitor and Hercules-compatible graphics controller and the NEC MultiSync monitor and EGA card produce pleasing and readable presentations.*

card. Both monitor systems worked well, with very pleasing and readable presentations.

Finally, the price for this system as listed in the features table and fact file are lower than the individual buyer may encounter because American Research normally sells it to dealers or distributors only. The machine is available, of course, under the ARC label from those sources.

—Charles Teets



### FACT FILE

#### ARC 286 Turbo

American Research Corp.  
1101 Monterey Pass Rd.  
Monterey Park, CA 91754  
(800) 423-3877  
(213) 269-1174

List Price: \$2,200 (tested configuration)

**In Short:** A well-built 6- or 8-MHz machine that comes with all you need to get started, except for the monitor and the mono/graphics controller, for \$1,249. To really work with the machine, however, you need to add \$1,155 worth of other niceties like a monitor and a 30-Mbyte disk drive.

CIRCLE 662 ON READER SERVICE CARD

## QSP Supermicro 286

The shipping carton reads APC AT Supercom, the machine is labeled APC AT, and the vendor, QSP, calls it the Supermicro 286. Suntek supplies some of the Supermi-

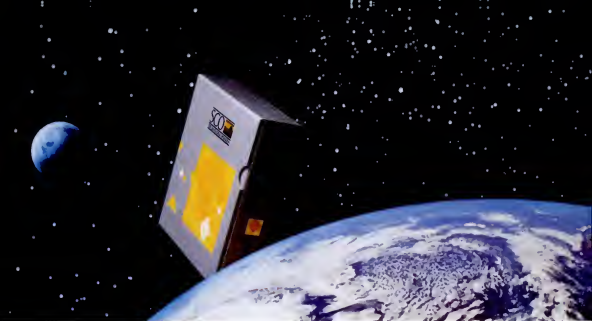
cro's parts and all the support. This machine displays multiple personalities, and the condition extends beyond its name.

The Supermicro 286 is a surprising combination of some very good features and rather odd shortcomings. One of its assets is the Phoenix Technologies BIOS, the most popular commercially available IBM-compatible ROM BIOS. Another plus is its ability to use either one or zero wait states in normal or turbo modes; those options are selected through the use of jumpers located on the motherboard. The Supermicro's 8-MHz, zero-wait-state mode runs as fast as some 10-MHz machines.

One of the Supermicro's most disturbing shortcomings is its handling of RAM. Most systems will allow you to mix 64K-bit and 256K-bit RAM chips to give you some flexibility in the amount of conventional memory you load into your machine. The Supermicro 286 allows either 64K-bit or 256K-bit RAM chips, but not a combination of both. This requirement limits you to two configurations: 256K bytes (which hampers the operation of many applications) or 1 megabyte of RAM. There is another problem: if you have 1 megabyte of RAM in the machine and you try to run an Intel Above Board,



*You can select the option of using one or zero wait states in normal or turbo modes through jumpers located on the motherboard of the QSP Supermicro 286. The computer's 8-MHz, zero-wait-state mode is able to run as fast as some 10-MHz machines.*



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## ■ LOW-COST AT COMPATIBLES



### FACT FILE

#### QSP Supermicro 286

QSP

780 Montague Expwy. #207

San Jose, CA 95131

(408) 435-8222 (Sales)

(415) 657-1410 (Support)

List Price: \$2,125 (tested configuration)

**In Short:** A 6- or 8-MHz machine that could have been built a little better and may be limited by its 135-watt power supply, but \$1,500 is a good base price for everything you need to get started.

CIRCLE 881 ON READER SERVICE CARD

the 384K bytes that sit above the 640K bytes of base memory will interfere with the extended memory board, and the board won't work at all. QSP is allegedly looking into this matter.

The quality of assembly also falls on the debit side of the Supermicro's balance sheet. The cover of the system unit did not fit well and caused problems every time I opened the machine. And inside, the cables were not folded and secured, so they constantly got in the way when I tried to replace the cover.

Many of the configuration options are set with jumpers on the motherboard. This way of setting the options is awkward, but you should have to set them only once and then forget about them. You can change from normal mode (6 MHz) to turbo mode (8 MHz), however, by moving only one of the jumpers, and you'll probably want to change back and forth often. I prefer mode switching to be available from the keyboard or located on the outside of the machine where I can get to it easily. A reset button located conveniently on the front of the machine compensates for some of the other hassles.

In my opinion, the Supermicro's old-AT-style keyboard leaves something to be desired. It feels mushy enough to interfere with my typing, but keyboard preference is, of course, always a matter of personal taste.

The documentation, as with most inexpensive AT compatibles, is minimally sufficient; it gives you just enough information to configure the system and its options. —Charles Teets

## Maxum-286

47th Street Computer is one of New York City's foremost mail-order houses, known for quick delivery, low cost, and high performance. Its Maxum-286 was one of the first AT clones on the market. The system may not have the two clock rate speeds of other clones, but the Maxum-286 does come with a rugged Priam drive.

At \$1,249, the base unit is one of the less costly 286 clones. It comes with an 8-MHz 80286, 512K bytes of RAM, a 1.2-megabyte drive (ours was a Mitsubishi), and a combination hard/floppy disk drive controller board. The motherboard includes both DIP switches and jumpers for setting such configurations as color or monochrome monitor, zero or one wait state, and the amount of RAM on the motherboard (which can hold up to 1 megabyte). Its five 16-bit and three 8-bit slots may not total as much as the 12 slots found in the Five Star AT, but they are more than sufficient for the vast majority of users. The unit I tested also came with an additional 128K bytes of RAM, to bring the total to the DOS limit of 640K bytes, a 24-megabyte Priam, a monochrome adapter, and an I/O card with serial, parallel, and game ports. The Taiwanese controller card can accommodate two hard disk

drives and two floppy disk drives.

There's no mistaking the Maxum-286 for an IBM PC AT. Rather than the familiar horizontal LED-lit panel next to the vendor logo, the Maxum-286 sports a vertical panel directly alongside the floppy disk drive. Much nicer, though, is the easily accessible Reset button that does away with the need to play the Ctrl-Alt-Del finger-gymnastics when you want to perform a warm reboot. And when you power up the Maxum-286, you hear the unmistakable sound of a ball falling into a roulette



### FACT FILE

#### Maxum-286

47th Street Computer

36 E. 19th St.

New York, NY 10003

(800) 221-7774

(212) 260-4410

List Price: \$2,215 (tested configuration)

**In Short:** Inexpensive 8-MHz-only AT compatible from one of the biggest names in the mail-order business, with an excellent (Priam) hard-disk-drive option. 47th Street's Maxum-286 Turbo may be an even better bet, though.

CIRCLE 880 ON READER SERVICE CARD



*Though it may not have the two clock rate speeds of other compatibles, the Maxum-286 is equipped with a high-performance Priam hard drive. An added feature is the easily accessible Reset button that can be used in place of the clumsy Ctrl-Alt-Del combination.*

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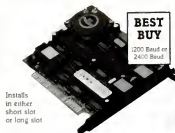
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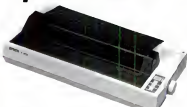
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## ■ LOW-COST AT COMPATIBLES



### Low-Cost ATs: Summary of Features

(Listed in ascending order by price of configuration tested)

Product/ Manufacturer	Base price	Base price includes	Price of config. tested	Configuration tested
 <b>CompuAdd Standard-286 II</b> CompuAdd Corp.	\$1,095	512K RAM, 1.2-Mbyte floppy disk drive, hard/floppy disk controller card, keyboard	\$1,811	All features of base model, 30-Mbyte Seagate hard disk drive, mono/graphics card with parallel printer port, additional 512K RAM on system board
<b>QSP Supermicro 286</b> QSP	\$1,500	1 Mbyte on-board RAM, 1.2-Mbyte floppy disk drive, hard/floppy disk controller card, monochrome monitor and mono/graphics card, keyboard	\$2,125	All features of base model, 30-Mbyte hard disk drive
 <b>Maxum-286 Turbo</b> 47th Street Computer	\$1,395	640K RAM, 1.2-Mbyte floppy disk drive, hard/floppy disk controller card, keyboard	\$2,129	All features of base model, 24-Mbyte Priam hard disk drive, amber monochrome monitor, mono/graphics card
<b>ARC 286 Turbo</b> American Research Corp.	\$1,249	640K RAM, 1.2-Mbyte floppy disk drive, hard/floppy disk controller card, keyboard	\$2,200	512K RAM, 1.2-Mbyte floppy disk drive, hard/floppy disk controller card, 30-Mbyte hard disk, second 1.2-Mbyte floppy disk drive, monochrome monitor, mono/graphics card, keyboard
<b>Maxum-286</b> 47th Street Computer	\$1,249	512K RAM, 1.2-Mbyte floppy disk drive, hard/floppy disk controller card, keyboard	\$2,215	All features of base model, 24-Mbyte Priam hard disk drive, v/o card with serial, parallel, and game ports, mono/graphics
<b>Kammerman Labs TCS-7000</b> Kammerman Labs	\$1,657	1 Mbyte on-board RAM, 1.2-Mbyte floppy disk drive, hard/floppy disk controller card, keyboard	\$2,328	All features of base model, 20-Mbyte Seagate hard disk drive, Princeton Max-12 amber monitor, mono/graphics card
 <b>PC Designs ET-286I</b> PC Designs Inc.	\$2,400	1-Mbyte on-board RAM, single 1.2-Mbyte floppy disk drive and controller card, Princeton Graphics Max-12 monochrome monitor, mono/graphics card, keyboard	\$3,145	All features of base model, 30-Mbyte hard disk drive
<b>Multitech Acel 900</b> Multitech Electronics Inc.	\$2,395	512K RAM, 1.2-Mbyte floppy disk drive, hard/floppy disk controller card, monochrome monitor, mono/graphics adapter card, v/o card with two serial ports and additional parallel port, keyboard	\$3,295	All features of base model, 30-Mbyte hard disk drive
<b>Victor V286</b> Victor Technologies Inc.	\$2,195	512K RAM, single 1.2-Mbyte floppy disk drive and controller card, keyboard	\$4,095	All features of base model, 40-Mbyte hard disk and controller card, color monitor, CGA card

 —Indicates Editor's Choice    ●—Yes    ○—No

Options	Ports included in base price	Slots	Power supply (watts)	Reset key	Keyboard style	Claimed clock speed (MHz)	Controller card	Warranty	BIOS manufacturer
30-Mbyte hard disk drive, \$829; 70-Mbyte hard disk drive, \$1395; flat-screen monochrome monitor, \$109; mono/graphics card with parallel printer port, \$99; AT multifunction card, \$189; EGA card, \$199; CGA card, \$79; I/O card with serial, parallel, clock, and game ports, \$79	None	8	200	●	Old AT	6 and 8 MHz	Two hard and two floppy disk drives	1 year	Phoenix
20- to 30-Mbyte hard disk drive, \$519 to \$825; Samsung mono/graphics monitor, \$95; Tatyung amber or green monitor, \$110; EGA monitor, \$489; EGA card, \$255	2 serial 1 parallel	8	200	●	Old AT	6 and 8 MHz	One hard and one floppy disk drive	1 year parts 8 months labor	Phoenix
Monochrome monitor, \$99.95; mono/graphics card, \$89.95; I/O card with serial, parallel, and game ports, \$89; EMS and/or standard memory board, \$150	None	8	200	●	Old AT	6 and 8 MHz	Two hard and two floppy disk drives	1 year	Eden Software
Monochrome monitor, \$149; mono/graphics card, \$149; (Hercules card and monochrome monitor with system, \$200 extra); EGA monitor, \$599; EGA card, \$399 (EGA card and monitor with system, \$900 extra); Mini-I/O card with serial and parallel port, \$99	None	8	200	○	Old AT	6 and 8 MHz	One hard and one floppy disk drive	2 years	AMI
Monochrome monitor, \$99.95; mono/graphics card, \$89.95; I/O card with serial, parallel, and game ports, \$89; EMS and/or standard memory board, \$150	None	8	220	●	Old AT	8 MHz	Two hard and two floppy disk drives	1 year	Computer System
20-Mbyte Seagate hard disk drive, \$398; Princeton Max-12 amber monitor, \$208; mono/graphics card, \$84	None	8	220	●	Old AT	8 and 8 MHz	At least one hard disk drive and two floppy disk drives	1 year parts 90 days labor	Tatung
20- to 80-Mbyte Seagate hard disk drive, \$579 to \$1,275; 20- to 72-Mbyte Core hard disk drive, \$1,395 to \$2,995; 40- to 60-Mbyte Priam hard disk drive, \$1,145 to \$1,495; Princeton Graphics HX-12 color monitor, \$325; HX-12E color monitor, \$375; NEC Multisync monitor, \$550; Hercules color/graphics card, \$75; Everex Edgecard, \$125; EGA card, \$175; EGA Plus card, \$200; 512K RAM AFT Rampage Above Board expansion card, \$500; 20-Mbyte internal tape backup, \$825; 60-Mbyte internal tape backup, \$795; 20-Mbyte external tape backup, \$725; 60-Mbyte external tape backup, \$895	2 serial 1 parallel	8	192	●	Old AT	8 and 10 MHz	Two hard and two floppy disk drives	1 year	AMI
30- to 40-Mbyte Seagate hard disk drive, \$1,049 to \$1,209; EGA card, \$379; AT multifunction card, \$299; EGA monitor, \$599	2 serial 2 parallel	8	205	●	New AT, old AT function keys	6 and 10 MHz	Two hard and two floppy disk drives	1 year	Award Software
Color monitor, \$595; CGA card, \$99; monochrome monitor, \$199; monochrome adapter, \$99; 40-Mbyte hard disk drive, \$1,799	1 serial 1 parallel	8	200	●	Old AT	6 and 8 MHz	One hard disk drive only	1 year	Victor Technologies

## ■ LOW-COST AT COMPATIBLES

wheel. Don't worry. The Priam drive is only revving its engines.

While the Maxum-286's BIOS was incompatible with the PC Labs hard disk seek test, Priams are one of the higher performance hard drives on the market, usually posting times of under 30 milliseconds per seek access. The Priam drive also differs from many others in that it requires a separate set-up program.

Other than the hard disk seek test, the Maxum-286 had no trouble with the PC Labs benchmark tests. The results, while acceptable, were not among the fastest tested here. Also, the space between the card guards and the back of the system was just a mite too short for the Intel Above Board, and inserting the board required



*The Maxum-286 Turbo speeds up performance with its rugged 24-megabyte Priam hard disk drive and an 8-MHz mode that runs in zero-wait-state mode. These elements help the Maxum-286 Turbo produce results closer to or better than those achieved with a 10-MHz clock rate.*

## ■ The Maxum-286's easily accessible Reset button does away with Ctrl-Alt-Del gymnastics.

bowing the back of the unit a little. The old-AT-style keyboard, which feels a little light on your lap, has raised ridges on the F and J keys and on the numeric pad's 5 key. This enables you to locate the proper finger positions without having to look down and away from the monitor.

The computer comes with MS-DOS 3.1, software for formatting the Priam drive, and a diagnostic disk. The documentation, which is fairly complete, includes MS-DOS programmer's and operator's guides. There is also a user's guide for teaching the basics about the computer hardware, providing such information as floppy disk drive and memory chip installation, operation of the diagnostics, and basic component descriptions. Unfortunately, the system does not come with BASIC (an additional \$79 for GWBASIC).

The Maxum-286 may be a respectable AT clone, and its vendor has definitely been in the business for a while, but take a look at 47th Street's Maxum-286 Turbo version, which is reviewed next. It's a better buy. —Vincent Puglisi

### Maxum-286 Turbo

Unlike 47th Street Computer's other offering (which didn't particularly impress us), the Maxum-286 Turbo is something to brag about. While most vendors are content to provide a dual-speed processor, 47th Street's house-brand AT has gone one better by making its 8-MHz mode run in zero wait state. In addition, 47th Street regularly packages its units with high-performance Priam hard disk drives. Finally, the \$1,395 price of the base system can only go down.

The Maxum-286 Turbo comes with 640K bytes of RAM, a 1.2-megabyte floppy disk drive (a Fuji), an old-AT-style keyboard, and a software selectable 6- or 8-MHz 80286. There are three 8-bit and five 16-bit buses on the motherboard. (This may pose a problem later on if you need more 16-bit buses, but considering the system's price/performance ratio, it is something you can live with comfortably.) The motherboard also comes with the usual DIP switches and jumpers for setting such configuration information as the display type and the amount of on-board memory (the system can hold up to 1 megabyte). The Maxum-286 Turbo tested also came with a 24-megabyte Priam hard disk drive, a monochrome graphics adapter, and a

Bondwell amber monochrome monitor.

Needless to say, the Maxum-286 Turbo ran all PC Labs benchmark tests without a hitch. With its 27-millisecond (benchmark-tested) Priam drive, the 8-MHz clock rate, and zero wait state, the Maxum-286 Turbo screams down Silicon Valley, chewing up data as if it were quarter-mile post markers in the Kentucky Derby and producing results closer to or above that achieved with a 10-MHz clock rate. Nor did any of the compatibility tests provide any problems; software ran smoothly and the boards slipped in and out easily.

The combination of the Bondwell mon-



### FACT FILE

**Maxum-286 Turbo**  
47th Street Computer  
36 E. 19th St.  
New York, NY 10003  
(800) 221-7774  
212/260-4410

**List Price:** \$2,129 (tested configuration)

**In Short:** An above-average 6- or 8-MHz AT compatible with no wait states that equals or surpasses 10-MHz machines. The optional Priam hard drive is first-rate.

CIRCLE 648 ON READER SERVICE CARD

# In minutes, blah blah blah won't look so blah.

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## ■ LOW-COST AT COMPATIBLES

itor and the monochrome graphics adapter provided a clear and sharp display. And the old-AT-style keyboard, while not overly impressive, is functional and includes the raised nodes many touch-typists find attractive. Because switching from one mode to another does not require running any software, you can do so within a program. You simply use the Ctrl-Alt-Backslash key combination. Except for the fact that you need to run its own format and set-up programs, installing the Priam drive is a snap.

The software included DOS 3.2, GWBASIC, and utilities for the Priam drive. The documentation is the standard Microsoft and Priam manuals.

If you are interested in a machine that provides power and high performance with reliability, consider taking a Maxum-286 Turbo to the starting gate.

—Vincent Puglia

### CompuAdd Standard-286 II

The only thing standard with the CompuAdd Standard-286 II that I tested was its AT compatibility and its name. With its 8-MHz clock, zero wait state, speed and reset switches, and six 16-bit buses, the Standard-286 II stands out from its competition. The machine is not perfect—there are a few little things that I would have differed if I could—but its performance, features, and price are enough to make me want to take it home.

For \$1,095, the base system comes with 512K bytes of RAM, a 1.2-megabyte floppy disk drive (the one supplied was a TEAC), a combination floppy/hard disk drive controller card, an old-AT-style keyboard, and a switch-selectable 6- to 8-MHz 80286, with zero wait state. The motherboard includes a Phoenix BIOS, two 8-bit and six 16-bit buses, a slot for an optional 80287, and appropriate DIP switches and jumpers. The unit tested also came with an additional 512K bytes of RAM (the RAM was configured as 640K bytes of conventional memory and 384K bytes of extended memory), a monochrome graphics adapter with a parallel printer port, and a 30-megabyte Seagate hard disk drive.

The reset button and the speed mode switch on the back panel of the unit are noteworthy. You can switch clock rates from within a program without having the system reboot. While some people may argue that having the reset switch in the back of the machine prevents accidental resetting, its close proximity to the speed switch can defeat that purpose. It's preferable to have all switches on the front where they are both accessible and visible.

The PC Labs benchmark test results demonstrate that the Standard-286 II in 8-MHz zero-wait-state mode is one of the most respectable modes of any of the clones in this article. PC Labs rated the Seagate drive access time at 33 milliseconds. While it may not be the fastest time we found for the drives tested, it is more than adequate for an AT. The Phoenix BIOS assured complete compatibility with all the software we tested, and the system had no trouble with the EGA card and the Above Board.

The keyboard is one of those nondescript models, its one claim to fame being the extra nodes on the F and J keys and on the 5 key on the numeric keypad. Although I did not fully test its compatibility against the Hercules standard, the monochrome graphics adapter appears to supply

the same functionality and benefits.

Inserting cards into the Standard-286 II proved to be something of a chore; it required pushing the back of the system so that the bottom of the card's bracket would slip into its proper groove and allow the pins to fit into the slot. Quite possibly the review unit was not the norm, and the problem stemmed from a lapse in assembly rather than design.

When you consider its base price of \$1,095, you cannot go wrong if you purchase a Standard-286 II, especially if you get CompuADD to install the cards.

—Vincent Puglia



### FACT FILE

#### CompuAdd Standard-286 II

CompuAdd Corp.  
12303-G Technology Blvd.  
Austin, TX 78727  
(512) 250-1489

List Price: \$1,811 (tested configuration)

**In Short:** Low base price, a Phoenix BIOS, the ability to switch speeds with rebooting, and a reset switch make this one of the best of the bargain compatibles.

CIRCLE 648 ON READER SERVICE CARD



*The CompuAdd Standard-286 II is not a standard AT clone at all. With an 8-MHz clock, zero wait state, and six 16-bit buses, the Standard stands out from the crowd. Its 30-megabyte Seagate hard drive may not have the fastest drive access time, but it's more than adequate for an AT.*

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CIRCLE 210 ON READER SERVICE CARD

## Multitech Accel 900

Of the machines I reviewed, the Multitech Accel 900 was the only one that boasted a 10-MHz clock rate as one of its two default settings. It also was the only system I tested that cost more than \$2,000 for the base system. On the whole, the Accel 900 ran just beautifully, and I experienced no problems, but the above-average performance did not seem high enough for the above-average price, especially when you consider that adding a 30-megabyte drive with a 30-millisecond access time from the same vendor is going to put you back at least another \$900.

The Accel 900 comes with 512K bytes of RAM, a combination floppy/hard disk drive controller card, a 97-key keyboard, and a 1.2-megabyte floppy disk drive. Also included in the Accel's base configuration are a monochrome display with monographics adapter and parallel port and an I/O card with two serial ports and an additional parallel port. The motherboard sports two 8-bit and six 16-bit buses, appropriate DIP switches and jumpers, and a socket for an optional 80287.

The hybrid keyboard is a functional combination of the new AT and the old PC keyboards: you get the same familiar ten function keys on the left but also a separate cursor keypad (not the inverted-T layout of the new AT). On the negative side, however, the keys are sculpted differently; the depressions feel as though they are steeper and deeper than those on other keyboards, and there are no raised knobs on the F and J keys. The quality of the display is on a par with that of the majority of generic monochrome monitors. Although I did not fully test the vendor's claim that the machine's monochrome graphics adapter is Hercules



The Accel 900, at over \$2,000, boasts a 10-MHz clock rate, 512K bytes of RAM, a floppy/hard disk controller card, a 1.2-megabyte floppy disk drive, monochrome display with monographics adapter and parallel port, and an I/O card with two serial and one parallel port.

■ In its 10-MHz mode, the Accel 900 raced through the PC Labs benchmark tests, posting expected times.

compatible, it appears to function as one and to give many of the same benefits.

You switch the clock rate from 10 to 6 MHz by running a memory-resident utility called Speed and then hit the appropriate keys to go from one mode to the other. While the system is using the 10-MHz clock rate, an appropriately labeled light on the front panel lights up. If you are one of those people who need to switch from mode to mode, that light is clearly an invaluable asset. In its 10-MHz mode the Accel 900 raced through the PC Labs benchmark tests, posting the expected times. There were absolutely no compatibility problems with any of the software that we used for testing.

The Accel 900 comes with a variety of software, including MS-DOS 3.1 and a set of utilities for the monochrome graphics adapter. Unfortunately, you do not end up with as many perks as you may initially think you have. Some of the utilities (for example, Sdate, Stime, and Today) run only on 8088-based PCs, not on AT-class 80286s. Others require BASICA, which is not included in the system's base price. Perhaps Multitech decided that making two separate floppy disk drives would cost too much. The documentation is excellent; the user's guide even supplies scan codes for the keyboard.

Because the first Accel 900 did not have an installed hard disk, Multitech sent us another. Lo and behold, along with the 30-megabyte Seagate, the system also came with a multifunction Above Board clone (\$349) and two shareware programs that Multitech bought distribution licenses for—PC-Write, a highly-thought-of word processing program (see *PC Magazine*, Volume 5 Number 2), and PC-DeskTeam, a SideKick-like desktop utility.

The only problem with the Accel 900 is its price. In a market increasingly driven more by price than anything else, Multitech's Accel 900 is too expensive.

—Vincent Puglia



### FACT FILE

**Multitech Accel 900**  
Multitech Electronics Inc.  
1012 Stewart Dr.  
Sunnyvale, CA 94086

**List Price:** \$3,295 (tested configuration)  
**In Short:** The desirable 10-MHz base speed (also 6 MHz) of this compatible is offset by its steep price.

CIRCLE 647 ON READER SERVICE CARD

# It took minutes to plot this strategy.

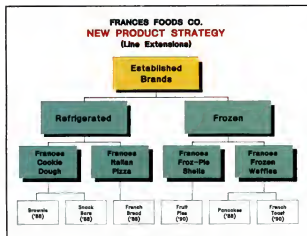


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## Kammerman Labs TCS-7000

Despite its racier outward appearance, the Kammerman Labs TCS-7000 delivers the same functionality and performance improvements found in many of the other AT clones. This is not to say that the TCS-7000 does not stand out in the clone world. It does, but only if you consider its \$1,671

base price, its documentation (which is enclosed in two IBM-like manuals), the fact that Kammerman Labs OEMs the unit from the well-known Tatung Co. and its warranty policy (90 days on labor, and 1 year on parts).

The basic TCS-7000 system comes with 1 megabyte of RAM (configured as 512K bytes of conventional RAM and 512K bytes of extended memory), a 1.2-megabyte floppy disk drive (a Panasonic), a combination hard/floppy disk drive controller, and an 80286 CPU with a selectable 6- or 8-MHz clock rate. The unit tested also came with a 20-megabyte Seagate hard disk drive (factory rated at 85 milliseconds), a monochrome graphics adapter, and a Princeton Graphics Max-12 amber monitor. The unit also sported an easily accessible reset button and three 8-bit and five 16-bit slots. Accompanying the two manuals were MS-DOS 3.1, diagnostics, and assorted utility programs.

The TCS-7000 ran through all PC Labs tests with only one problem. Tatung's BIOS is not completely compatible with IBM's, thus invalidating the PC Labs benchmark test that uses interrupt 13h for the hard disk seek test. Fortunately, the only programs I know that use this interrupt are those which benchmark-test hard

disk performance. While the rest of the results will not impress any power users, they were on a par with other comparable clones. The keyboard, manufactured in Taiwan, is similar to an old-style-AT keyboard except for its light weight and the small nodes on the F and the J key and the 5 key on the numeric keypad. While serviceable, the keyboard is not as nice as the Maxiswitch keyboards, which allow you to swap the Esc key for the tilde key.

As good as the documentation is, there are notable omissions. The manual fails to display a diagram showing where on the

### PC EDITOR'S CHOICE

*Three of the nine AT compatibles stood out sufficiently to warrant an Editor's Choice. While none of the three is perfect, each offers something the others do not.*

*The CompuAdd Standard-286 II offered the most value for the money. For only \$1,811 you get a 6- and 8-MHz 80286 with zero wait states, a 30-megabyte Seagate hard disk drive, and buttons for performing a warm reboot and switching between the two clock rates. The only significant problem was with the chassis assembly. The unit we tested appeared to be slapped together.*

*If you are looking for quality and speed, check out 47th Street Computer's Maxum-286 Turbo. It boasts 6- and 8-MHz clock rates with zero wait states, a 24-megabyte Priam drive, and a Bendwell monochrome monitor with a monochrome graphics adapter, for under \$2,400.*

*For the user interested in UNIX and Xenix or some of the latest hardware embellishments to AT-style computers, we recommend the PC Designs ET-286i with its 6- and 10-MHz 80286, Princeton Graphics Max-12 monitor, Maxiswitch keyboard, and motherboard, which can accommodate up to 4 megabytes of RAM on board. Its drawbacks include a wait-state jumper that is very difficult to get to and a mode-switching key sequence that is too similar to the warm boot key sequence.*



### FACT FILE

#### Kammerman Labs TCS-7000

Kammerman Labs  
7861 SW Cirrus Dr.  
Beaverton, OR 97005  
(503) 626-6877

List Price: \$2,328 (tested configuration)

**In Short:** The Tatung-built Kammerman Labs TCS-7000 provides compatibility, a software-selectable dual-speed (6- and 8-MHz) processor and a convenient reset switch. Slightly more expensive than comparable machines.

CIRCLE 646 ON READER SERVICE CARD



The Kammerman Labs TCS-7000 includes 512K bytes of conventional RAM and 512K bytes of extended memory and comes with credible documentation. The unit, which Kammerman Labs OEMs from the Tatung Co., is protected by a 90-day labor and 1-year parts warranty.

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CIRCLE 188 ON READER SERVICE CARD

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## ■ AT COMPATIBLES

motherboard the J12 jumper, used for setting the default clock rate, is located. The manual also fails to document the J2 jumper other than to state that it is a RAM jumper—which brings us to the on-board memory.

If you are thinking that 1 megabyte of RAM on the motherboard is something for nothing, think again. Installing an Intel Above Board will require a certain amount of juggling if you intend to use the entire megabyte. Because of a combination of the board's design and the set-up program, you can only configure the on-board mem-

■ Despite its racier outward appearance, the TCS-7000 delivers the same functionality and performance found in many other AT clones.

ory so that the megabyte is evenly divided between conventional and extended memory or set to a maximum of 640K bytes of conventional memory. If you opt for the first setting, you need to purchase an additional memory board to bring the conventional memory up to the DOS limit. If you opt for the second configuration, you either lose the use of the additional memory or replace two banks of 256K-bit chips with 64K-bit chips and then use the 256K-bit chips on your Above Board (or Above Board-compatible board).

That the Kamerman Labs TCS-7000 provides you with a viable alternative to the IBM PC AT you cannot deny. But at a time when many other AT compatibles are selling at or below \$1,400, why should you pay more for the same performance?—**Vincent Puglia**

*Joe Desposito is a project leader in PC Labs. Vincent Puglia is a frequent contributor to PC Magazine. Charles Teets is president of TCT Consulting, a Mount Laurel, New Jersey, consulting firm.*

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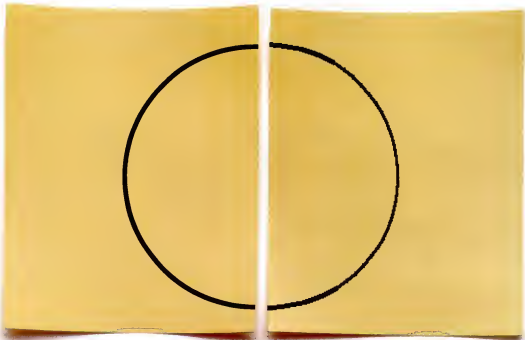
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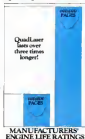
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# STALKING THE LOW-END INTEGRATED SOLUTION

**I**ntegration—this buzzword, which still buzzes in some quarters, implies a desirable yet elusive state in which the whole is equal to or maybe even greater than the sum of its parts.

In software, integration aims for a smooth transition from one application to another. In some instances, integration means that you can share similar commands across applications; in others, it means you can view similar-looking screen displays regardless of the particular application. In the optimal integrated environment this "sharedness" applies to data as well. But in the real world, integration exists only on a sliding scale.

Not so many months ago, only experienced powermongers or masochistic pioneers would dare to tread on integrated turf. Programs like Ashton-Tate's *Framework*, Lotus Development Corp.'s *Symphony*, and The Software Group's *Enable* were born of this era. These programs, characterized by a bigger-is-better approach, satisfy the power user, but most everyday users are confounded by the breadth of each application they include.

These powerful programs also list impressive arrays of features—equaled by their impressive price tags, in excess of \$400. As a result, countless third-party vendors reap benefits from the complex intricacies of these packages: seminars, books, and tutorials abound.

*Users have long been searching for an ideal of integration that is only now beginning to materialize: substantial power at an affordable price. The four programs reviewed here represent various levels of sophistication for under \$200.*

## ■ INTEGRATED SOFTWARE

### BEGOTTEN FROM THE CHEAP PC

Until recently, *simple, integrated, and low cost* couldn't be used together to describe a software package. But now that personal computers are powering small and midsize businesses and data has become a desktop commodity, a new set of users is looking for low-cost, easy-to-use integration of text, database, spreadsheet, graphics, and telecommunications applications.

Another catalyst for the low-cost integration evolution is undoubtedly the abundance of cheap PCs with minimum configurations of 256K bytes of RAM, creating a new market of users who "want it all" and want it inexpensively. After scoring their computer at bargain prices, they demand the software equivalent. How can they justify spending \$500 to \$800 for several individual applications when they've spent little more than that same amount on their entire machines? Since integrated packages offer more modules for the money, they have a strong potential following, especially now that lower-cost packages are available.

Priced in the \$85 to \$200 range, the software reviewed here does indeed offer integration at attractive prices and simplicity with quick startup. These low-cost integrated packages—Software Publishing Corp.'s *PFS:First Choice*, Able International's *Able-One*, Tandy/Radio Shack's *DeskMate/PC*, Alpha Software Corp.'s *Electric Desk*, and in the accompanying sidebar (see "Words & Figures: Following the Beat of a Different Drummer") Lifetree Software's *Words & Figures*—don't all meet every user demand, but they are getting closer to the ideal promulgated by the high-cost pioneers of integration. But remember, life in the bargain basement is always a series of trade-offs.

**DANGEROUS CURVES** Integrated packages level the learning curve by offering consistent command structures. Regardless of the application, users see a program that looks and acts the same. They have the same help key or command, the same save key or command, and so forth.

But uniformity has its drawbacks. First, power is often traded for ease of use. When you're trying to cover all the bases with the same player, it's difficult to cover them all optimally.

Second, the standard user interface may be inappropriate for some applications. The 1-2-3 interface is a divine creation in a spreadsheet, but can it work with a word processor?

Finally, applications have evolved with some practical restrictions. Documents have margin settings, spreadsheets have row and column designations, and databases have fields of information. Getting the information from one application to the other while preserving the form can be a nerve-racking task.

**THE BATTLE RAGES ON** Software integration is a battle fought on two fronts: integration of the user interface and of the data itself. Various packages meet the challenges in different ways and to different degrees.

*PFS:First Choice* is the choice for creating a consistent and attractive user interface across components, but its power features are limited. *Able-One* attunes itself to the multitasking environment, but its power is diminished by a shaky user interface. *DeskMate/PC* offers an honest-to-goodness simulated desktop but little data integration; *Electric Desk* strikes a happy medium of power features, data integration, and ease of use. *Words & Figures* concentrates on integrating the applications most often used and ignores the others.

### PFS:First Choice

Software Publishing Corp. carved its reputation by acknowledging the legions of users who demand ease of use over powerful features. Beginning with *PFS:File* and continuing through *Report*, *Write*, *Graph*, *Plan*, and *Access*, the company has created a tremendously successful series of applications. Individually, these programs require six floppy disks and over 1 million bytes.

*PFS:First Choice* has streamlined the *PFS*: series of applications (except for *PFS:Graph*) onto two disks (one program disk and one dictionary) and about 180K bytes of RAM. And it works on systems with minimum configurations of 256K, unlike most of the other packages reviewed here. The astounding conservation of memory is attributed to economically rewritten code, good design sense, and a

## PC MAGAZINE FACT FILE

### First Choice



**PFS:First Choice**  
Software Publishing  
Corp.  
1901 Landings Dr.  
Mountain View, CA  
94039-7210  
(415) 962-8910  
List Price: \$149

Requires: 256K RAM, two disk drives,  
DOS 2.0 or later.

**In Short:** An entry-level integrated package with word processor, database, spreadsheet, and telecommunications components. This program takes the best features of the *PFS* series and puts them together under a single-user interface. Not copy protected.

CIRCLE 800 ON READER SERVICE CARD

fanatical dedication to preserving a shared command structure.

### CONSERVING THE ELEMENTS

*PFS:First Choice* includes four functions—word processor, database, spreadsheet, and communications—on a single disk. The database module integrates its own report-generation function. At the heart of the program's integration is the Directory Assistant, a directory screen that stores and sorts files by application.

*First Choice*'s user interface is clean, efficient, and minimalist. All four applications share the identical top-level menu command line. Thus database, spreadsheet, word processor, and telecommunications all have help, save, features, print, edit, and style commands. The pull-down menus below this level are invoked either with a point-and-press or a speedier keyboard command.

Whenever possible, the pull-down menus use identical commands across applications. You learn quickly that most of the application-specific commands appear under Features. Learn one component of the program and your efforts are translated across the other applications. Find-and-replace, spell, print, copy, move, and select work in each application. The program's clipboard acts like a buffer for pending moves, copies, and deletions both in an application and from one application to another.

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→ Serial port (2nd optional)	
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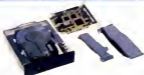
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- Western Digital controller
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- Boots from hard disk

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## ■ INTEGRATED SOFTWARE

The pull-down menus are clear-cut and logically organized. Each menu is highlighted by a shaded cube, and none contains more than six choices. The visual effect is a modernistic 3-D-like, attention-focusing menu. Individual applications are accessed from the main menu with "human speak" choices such as: create a document, create a file folder, and connect to another computer. If you're accustomed to more-sophisticated terminology, you may be initially flabbergasted at the simplicity.

**WORD PROCESSOR** Word processing is *First Choice's* core application, and the word processor is trim but quick. Cursor movement is speedy and responsive, and the clipboard buffer in this and the other applications holds text pending operations like moves and copies. Blocking text is handled by a series of somewhat tedious pull-down menus that you can bypass with handy Alt-key commands. After handling a few copies and moves by using the menu, you become strongly motivated to learn the keyboard route.

The screen display is adequately WYSIWYG, with all document reformatting, including double-spacing and tab changes, done on-screen, fast. Print enhancements are displayed as bold or colored characters. The only source of confusion I encountered was that the insert/overtyping modes differ only in the use of a box versus a line cursor, although other word processors use this convention.

The spell checker includes 80,000 words. It responds to mixed capitalization and offers correct spelling alternatives.

Options like Find and Replace are limited in *First Choice*. The word processor recognizes partial word matches, but it only searches forward and is not case-sensitive. Overall, the word processor is fluid, but operations such as manual page breaks or joining multiple files for printing can break your stride.

You can save text files in ASCII format, and the word processor component of *First Choice* accepts imports of ASCII files (the other components do not). A limited but adequate menu swiftly sets up page lengths, margins, headers, and footers. The package's print options menu lets you select items such as "compressed" or "letter quality" print from

## PUTTING PROGRAMS THROUGH THEIR PACES

**I**ntegrated packages of this caliber should be able to handle a full spectrum of simple office tasks. Here's how I put the five packages to the test.

I began with employee information stored in an ASCII file. The file, also used in *PC Magazine's* roundup of reviews on databases (see "Project Database II," *PC Magazine*, Volume 5 Numbers 12-14), contains 25 employee salary records. When possible, I imported that information into a database (sometimes via the word processor). When possible, I also imported the information into the spreadsheet from the word processor, database, or ASCII file.

within the program regardless of the application. Best of all, the integration with the database is simple and complete. You can merge any field in the database into a word processing document by simply typing the name of that field into the document.

**DATABASE** Like its predecessor *PFS:File*, the database in *First Choice* is easy to use, primarily because of its free-form design. You create your database form on a blank screen, free of restrictions as to where or how your form should be designed. With *First Choice*, each time you type a field name followed by a colon (for example, Last Name:), the program expects you to enter data. You can move freely about the screen typing in field names; when you press a function key, your database file folder is created, ready to fill with data.

*First Choice* allows unrestricted data entry. A field-validation technique (a means of specifying and verifying that a field should be restricted to a format such as date, numbers, alphanumerics, or a finite character length) is unavailable. While this type of database takes only moments to learn and implement, the user is put into a high-risk error category. Human inconsistencies such as typos, spurious spaces, dissimilar capitalizations, and inconstant date and monetary notations all pose po-

I used the spreadsheet to do what-if studies and calculate various employee salary raises based on their current salaries and performance incentives. I drew a bar graph depicting last year's salary versus this year's. Using the name and address fields in the database, I created a form letter informing the employees that they were about to receive a raise. When possible (only with *Words & Figures*), I used the captured spreadsheet cell information in my form letter.

Finally, I used the telecommunications component to send congratulatory mail to my imaginary employees.

—Robin Raskin

tential problems. New users, most apt to be unaware of the sanctity of data entry, are liable to find surprising output.

The database has adequate matching capabilities and can search for partial, relative, and negative matches, but it is limited to searching for one criterion per field. You can search for records that match several criteria in different fields but using only the NOT and AND (not OR) logical statements. One severe limitation is that the database cannot calculate fields.

Creating a report from the database file folder is a breeze. Reports are created by interactively specifying the page layout of the report, indicating which fields will be included, creating titles, and finally searching the records for those to be included. Unlike the database record form, the report module can handle various mathematical functions, including totals, counts, and averages.

The report module thus works retroactively on the database. Once you specify a calculation, all information in that field is treated numerically. You are able to create a derived formula based on information in other database fields. Nevertheless, there is no data integration between the database and the spreadsheet. During the review process, I wanted to play "what if" on a spreadsheet before committing myself to a specific salary increase for my employees.



The mail-merge is indicative of the smooth integration between the PFS:First Choice word processor and database. The items to be filled in from the database are indicated with asterisks.

To do so, I'd have had to reenter the data into the spreadsheet manually.

**SPREADSHEET** The spreadsheet is *First Choice's* most standalone application. While it has certain easy-to-use facilities, it is the weakest component in the program. Cursor movements and calculations are noticeably slow. Software Publishing says the program is designed to take advantage automatically of my installed 8087 coprocessor and suggested I check my configuration. My settings were correct, and the program is slower than the other parts of *First Choice*.

Another weak spot in the spreadsheet, reminiscent of the database problem, is in data validation. The spreadsheet cells can accept any type of input. You can input text in a numeric cell or format data incorrectly, thereby confounding the calculations. You can use the clipboard to copy cells and formulas to another spreadsheet or to a document, but you are limited by the size of the buffer to approximately 30 rows by 3 columns. Furthermore, you cannot import data into the spreadsheet.

On the plus side, some of the spreadsheet's especially handy features in-

clude the ability to automatically adjust the width of your columns and the quick-entry routine for putting headings and repeated cells into the spreadsheet. For instance, if you type in January, *First Choice* can fill subsequent cells with the rest of the calendar months, in order.

**TELECOMMUNICATIONS** The telecommunications feature is a high point of *First Choice*. Incredibly straightforward, it allows you to create complex log-in scripts by example. The program mimics and records the log-in sequence and can store this information as a script.

This application includes an attractive shell with a predefined menu that lists a number of popular services, including CompuServe and MCI. Press F1 and information on how to subscribe to these services is provided. The menu offers entry space for adding your own telecommunications haunts. Facilities for communicating with another PC in a host/caller mode are included.

A final feature worth mentioning is the bookmark capability. The bookmark is an electric placekeeper that makes it possible to jump from one application to another

while saving your original place. While not as visual a method as windowing, it does the trick.

## DOCUMENTATION AND SUPPORT

*First Choice's* 175-page manual is thorough and appealingly designed. Tutorials, screenshots, discriminating fonts and colors, and helpful icons make using the document pleasurable. Toll-free customer support is available, but not usually immediate.

## WINSOME AND WORTH IT

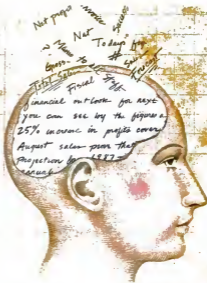
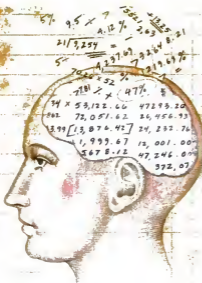
*First Choice's* individual applications create a pleasing whole that's well worth the price. I created an employee database and generated reports and form letters without a hitch. To use the spreadsheet, however, I had to reenter the identical data contained in my database. And lack of data validation is *First Choice's* greatest shortcoming, but it is also the reason the program is so easy to use. Those who depend on graphics may miss the inclusion of this feature.

But best of all, this thing of beauty doesn't need to be your joy forever. When you get too sophisticated for *First Choice*, you can then move on to the new *PFS:Professional* line, which caters to the needs of the corporate client. Meanwhile, for those new to computers or to integrated applications or those with modest needs in multiple applications, *PFS:First Choice* is a winning choice.

## Able-One

Able International's *Able-One*, with the most industrial strength of the packages reviewed here, is a complete integrated package with primitive multitasking capabilities. It includes word processing, database, spreadsheet, graphics, and telecommunications components—all for a staggeringly low price. Unlike the other packages reviewed here, it requires 512K bytes of memory.

*Able-One's* ability to create applications windows on the display screen makes it possible to simulate multitasking. Some bonafide background operations allow you to do tasks such as printing (to two different printers) while composing a document or transmitting a file via the telecommuni-



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## Sound's

Our internal modem card is designed specifically for the IBM PC, PC/XT, AT and most compatibles. Users who have PC-compatible units should call to see if our modem card will work with your machine. The board occupies one full length slot. The internal speaker lets you know about the call progress. A RS-232 serial port is standard, COM1 or COM2; you can use the port for other peripherals when the modem is not being used.

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## Outside

Our external standalone modem can be used with any computer or terminal which utilizes an RS-232C serial port. The modem fits snugly under a standard telephone. You can visually check the modem's operational status by the eight indicator lamps and adjust the modem's speaker output with the volume control knob at the back of the unit. A snap off front panel allows quick setting of the switches for all types of communication packages.

We include a modular phone cable to hook your modem to the wall phone jack, an easy-to-follow user's manual and of course, the Qubie's "No Risk Guarantee", our one year warranty, and 48 hour turnaround on warranty repairs. We bundle the modem with PC-TALK III software - an easy-to-use and complete communications package. Available for \$19 is our fully shielded RS-232 cable.

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## ■ INTEGRATED SOFTWARE



## FACT FILE



**Able-One**  
Able International Inc.  
30 N. Main St.  
Pueblo, CO 81003  
(303) 433-9600  
List Price: \$84.95  
Requires: 512K RAM,  
two disk drives, DOS 2.0  
or later.

**In Short:** Word processor, spreadsheet, graphics, database, and telecommunications combined in an integrated package that shares commands and simple data. The user creates applications windows and attaches data from one windowed application to another. Not copy protected.

CIRCLE 688 ON READER SERVICE CARD

communications component while you are in another application.

Each individual component is quite sophisticated in its breadth of features. The database, for example, is fully relational. Nonetheless, despite its multitasking approach and breadth of features, *Able-One's* performance is hindered. Integration of environments is tricky, and even with the program's many outstanding capabilities, *Able-One* is liable to drive novice users crazy. (Incidentally, another version of the program, *Able-Two*, is also available for the UNIX operating system. Perhaps it has better luck operating in an environment in which multitasking is more easily supported.)

**LOW-PRICED POWER** *Able-One* is a cut above the other packages in terms of office-automation power. It is the only package we reviewed that's obviously concerned with a multiuser environment, as evidenced by its support for LANs, queued print files, and multiple printers. You can encrypt files, assign passwords, and create command macros. A pop-up calculator is just one of the program's extra touches, designed to give users a full range of tools.

*Able-One*, like *PFS:First Choice*, maintains consistent commands across applications. The main menu lists the applications (called tasks). You can even add customized tasks, such as calling a remote computer, to the list. Pressing Esc always

## ■ INTEGRATED SOFTWARE

returns you to the previous screen. Commands such as move and copy exist in each application and perform comparable work.

Unlike *First Choice's* hierarchically organized pull-down menus, the *Able-One* command menu is a gargantuan scrolled affair. When you invoke the F9 key for the options menu, a 1-inch-wide pop-up menu strip along the left side of the screen appears. It contains the entire list of all possible commands for your particular task. You must scroll through this lengthy list until you find the command you need.

Experienced users are instructed to bypass the confusion by typing the first letter (or so) of the commands, but the F9 options menu must still be present. An example of the aggravation this causes occurs in the word processing application. In an attempt to bypass scrolling down the menu strip, I tried to reformat my text by typing the letter R. R invoked the right-margin format. Undaunted, I typed RE, which invoked the Remove command. Finally, I typed REF, which let me reformat. Memorizing which commands are single-letter and which require more letters for five applications is ridiculous. Because the reformat command acts on a single paragraph of text at a time, reformatting a document involves either scrolling through the menu and selecting Reformat or typing REF until your fingers hurt. Until *Able-One* uses pop-up or pull-down menus, it will be hard to take seriously.

The opening menu of the program includes English-language commands for a restricted number of items (28 words to be exact). Most of the words are task-oriented, such as database, file, and open. While typing "Open a database file" is cute, it's only the tip of the iceberg; the commands to create a database are much more complex.

*First Choice's* structural logic hits you in the face, but *Able-One's* is hard to get a hold on. Prompt messages are frequently less than explanatory. The function keys are used to invoke a hodgepodge of features including save, calc, communications, tasks, options, print, and windows. Some of these are applications, some are processes, one is a main menu shell, and some are status inquiries.

In fact, *Able-One* definitely needs better function-key housekeeping. F6 dis-

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CIRCLE 111 ON READER SERVICE CARD

## ■ INTEGRATED SOFTWARE

plays a list of files, but they aren't organized according to application. In *Able-One's* world, graphics, spreadsheet, telecommunications, database, and word processing files are mixed, and all appear on a huge discombobulated files menu. A sorted file directory would be welcome.

You access print functions outside of each application. This system makes sense in terms of shared resources, but mail-merge and report processes are organized as part of the print function as well. My personal philosophy treats mail-merge and reporting as part of the word processing or database function. By the time I invoke a print menu, I expect to see the words come off the printer within a few key presses.

The program can support as many as 20 windows; a more utilitarian number is 4. Applications windows are opened and then resized on an individual basis. So, for example, if you select word processing, your document occupies a full screen until

other data will be inserted. Attach merges whole spreadsheets and graphics files into the word processor and will allow the database to attach certain fields to a document. The database can also attach to one

of its fields information from the word processor. The spreadsheet application has no Attach feature for adding information; it can, however, link a cell in one spreadsheet to a cell in another.

■ In *Able-One's* world, files are mixed and all appear on one huge files menu.

you resize the window. If you then open a spreadsheet window, it occupies the full screen and consequently hides the word processing screen from view until you resize the spreadsheet. To situate your new windows correctly, you need a good memory to recall where your old windows had been placed. Resizing a window involves using the keypad to define a new location for one corner of the window. Moving from window to window requires the F8 window option, which uses a pop-up window to select from a list of open windows. Anyone who's ever used a mouse to pull and drag windows will feel prehistoric using *Able-One's* system.

**ATTACHING DATA** *Able-One* handles simple data transfer well, using its Attach command. From within an application, the Attach command marks the place where

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CIRCLE 269 ON READER SERVICE CARD

## WORDS & FIGURES: FOLLOWING THE BEAT OF A DIFFERENT DRUMMER

*Words & Figures offers true integration of a 1-2-3 clone and a word processor.*

If you could choose between partial integration across all applications or truly total integration on two fronts, which would you choose? Lifetree Software created *Words & Figures* to accommodate those who prefer the latter.

Lifetree cloned the all-time number-one application, *1-2-3* (Release 1A), added a few bells and whistles, and then created a word processor in its image. A *1-2-3* knockoff plus a word processor that uses a *1-2-3* /command interface equals *Words & Figures*.

Both the word processor and the spreadsheet rely on a *1-2-3* /command format. For those who feel most at home in front of the *1-2-3* /command line, this one's for you.

The program is completely and upwardly compatible with *1-2-3*, Release 1A. It has many of the enhancements found in Release 2. With a few exceptions, the spreadsheet's keyboard commands are identical to those of *1-2-3*.

*Words & Figures* can import .WKS spreadsheets, macros, and graphics. It can toggle between the spreadsheet and the word processor component, and it can insert the live spreadsheet or portions of the spreadsheet into a document. Even after the insertion, the spreadsheet remains "alive" in the word processor. Change the data in the document and the change is reflected in the spreadsheet—unless, of course, you'd rather "freeze" the spreadsheet, another option.

Tossed in to complete the package are *1-2-3*'s graphics capabilities and some enhancements. In sum, if your applications are spreadsheet-intensive, you can get word processing, graphics, and *1-2-3* activity, all for \$195.

**WORD PROCESSOR** While the spreadsheet is certainly impressive, the big news is in the word processor, but not

because of a huge list of power features. In fact, the word processor is somewhat sparse. Billed as an executive-class word processor, it was created to attach a letter or note to a spreadsheet, not to create the annual report. What it offers is true integration and not just token functional similarity. The components don't merely look alike, they share live data.

The word processor uses the *1-2-3* commands in new and ingenious ways. /File and /Print work in the word processor just as they would with a spreadsheet application. As you'd imagine, /global format defines print enhancements to your text instead of defining the features of your columns.

Initially, I found the *1-2-3* interface for word processing just a bit too far-fetched, but after embedding a few live worksheets in my documents I gleefully tossed my glue and scissors into the trashcan. As a matter of fact, the features table for this article was created using the *Words & Figures* program.


**A SPREADSHEET'S EYE VIEW** The word-processed document inserts spreadsheets into a user-created "viewport." *Words & Figures* can have multiple spreadsheet viewports within a document. As you scroll through the document and the cursor comes to a viewport, the program menu and cursor automatically switch from word processor to spreadsheet. Graphics cannot be inserted into the word-processed text.

Basic word processing functions are handled well. *Words & Figures* can search (/global locate) and replace (/global replace) backward and forward, justify, and create multiple margin settings with a document, and it includes headers and footers. Pop-up menus invoked from the /command line accommodate user-defined parameters.


Noticeably absent from the word processor are a spelling checker and any mail-merge, form-letter, or report-generation capabilities. In this regard the word processor is really more of an advanced note-maker than a report component. I would think that the spreadsheet/document connection could be made stronger with mail-merge and form-letter integration. As creators of the well-known *Volkswriter* series, I would expect Lifetree to recognize the need. Graphics cannot be inserted in the text—a would-be nicety.

**SPREADSHEET** The spreadsheet stacks up very well to Release 1A and has most of the features that Release 2 includes. I had no trouble importing .WKS, ASCII files, and *1-2-3* PIC files and macros. The *Words & Figures* spreadsheet menu is identical to *1-2-3*'s with the addition of a built-in Audit command, a Status command, as well as a few others.

From an initial menu, you select text



### FACT FILE



**Words & Figures**  
Lifetree Software Inc.  
411 Pacific St.  
Monterey, CA 93940  
(408) 373-4718  
List Price: \$195  
Requires: 256K  
RAM, two disk drives,  
DOS 2.0 or later.

**In Short:** A *1-2-3*, Release 1A, clone that contains a toggle to a simple word processor. The word processor uses the same *1-2-3* command interface. The spreadsheet, when merged into the document, can act as a .WKS spreadsheet. Not copy protected.

CIRCLE 891 ON READER SERVICE CARD

or a worksheet environment and can then toggle (Alt-F10) between the two. The worksheet command line is a dead ringer for 1-2-3 except that *Words & Figures* has added Audit and Status commands. The Audit command lets you easily toggle back and forth between your working spreadsheet and an audit-trail spreadsheet that identifies the data cell contents and pinpoints errors, N/A, and CIRC references. The Status command invokes a handsome pop-up menu, which lists system information. The program automatically recognizes and uses the 8087, EGA, and expanded memory.

*Words & Figures* gives 1-2-3 a run for the money on a feature-by-feature comparison. The spreadsheet boasts a maximum size of 9,999 rows, larger than either of the 1-2-3 releases. Unlike Release 1A, it supports a third-key data sort, hidden columns, range transpositions, expanded memory, column widths greater than 72, and a sparse memory matrix.

The spreadsheet module is available in two versions; the small one accommodates users with 256K bytes, and the large one (using overlays) works faster and more efficiently. The 1-2-3 horizontal menus that appear on the control panel are eliminated. *Words & Figures* replaces them with attractive pop-up menus to indicate directories, macro names, and named ranges. Pop-up menus are also used to display current graph names after a /Graph Name Show command. Unlike 1-2-3, *Words & Figures* also includes an optional file-back-up command for saving your spreadsheet.

The program is speedy. Using the PC Labs 1-2-3 Routine, which creates a 500-cell spreadsheet, *Words & Figures* showed its stuff. Release 1A ambled along, finishing up in 1 minute and 14 seconds, while *Words & Figures* blasted



*It's a 1-2-3 worksheet? It's a letter to Frank? It's Words & Figures, and the spreadsheet viewed in this document is live. Change a cell entry in your document and your worksheet reflects the change.*

through in only 56 seconds. It's a speed demon's delight.

**GRAPHICS** *Words & Figures* graphics are easy to create, in much the same manner as 1-2-3 graphics. There are six graph options, including line, x-y, scatter, pie, bar, and stacked bar. Six variables can be graphed at once. The procedure for labeling titles and legends is identical to 1-2-3's.

As in 1-2-3, to print a graph you must store it and exit to the DOS prompt. A PICPRT program queries you for color, layout, and font, as well as hardware configurations. *Words & Figures'* PicPrint Fonts can be selected with an /Option/Font Command. There are 13 different fonts available, and the list of

over 200 printers includes support for PostScript devices.

**DATABASE** Many people use 1-2-3 as their database of choice, and their reason for doing so is obvious. A field is simply a cell packed with information, and a record is a row of these cells. For those who require calculated fields, a spreadsheet is actually a more than reasonable choice to use as a database. However, the *Words & Figures* database is best suited to small and medium-size non-text-intensive databases.

*Words & Figures* has a three-key sort for data and includes seven database statistical functions. You can query the spreadsheet using 32 search criteria, as well as wildcards.

## ■ INTEGRATED SOFTWARE

("Words and Figures" continued)

### INTEGRATION OF THE ELEMENTS

No other package I looked at allows for live-data integration. Those users who need such facilities will find the potential for using *Words & Figures* exciting. 1-2-3 users will be up and running in no time, and others will find the manual quite thorough and well organized.

### ■ 1-2-3 users will be up and running *Words & Figures* in no time.

*Words & Figures* breaks the text/number barrier in fine style and at a competitive price. Whether you're looking for speed, features, or an attractive interface, *Words & Figures* has something to offer.

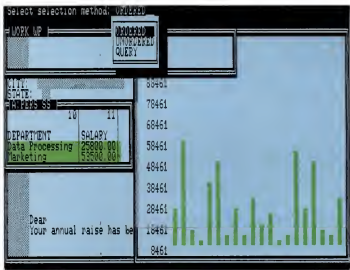
### SEGREGATED FROM THE LOTUS AFTERMARKET

It's no secret that Lotus Development Corp. has had serious public-relations problems since Release 2 of 1-2-3 was introduced. Users are reluctant to upgrade because of the steep price, copy protection, and lingering ill feelings over the initial incompatibilities between releases. Lifetree's *Words & Figures* is a carefully positioned value-added alternative.

On the other hand, even though *Words & Figures* compares more than favorably with 1-2-3, Release 1A, and tosses in simple word processing capabilities—all for \$195—it closes the door to the expanding 1-2-3-afterlife market. 1-2-3 is a standard and has been enhanced with scads of software packages (most recently *HAL, The Application Connection*, and *One-Source* from Lotus and a number of resident utilities from third-party vendors).

It's doubtful that *Words & Figures* will ever be enhanced with so many productivity aids. So if you choose it, be aware that you're restricting yourself to life in the lonelier non-1-2-3 world.

—Robin Raskin



Able-One creates windowed arrangements for your applications. Four applications are shown here: spreadsheet, database, word processor, and graphics. Able-One allows you to move between them using shared data. As is obvious from this sample screen, keeping your windows clean and organized is a bit tricky.

**WORD PROCESSING** The word processor is manageable, but it is not one of *Able-One*'s bounteous components. Unlike many word processors, its default mode is overtype. A Move command works to move marked blocks of text within a file, and the Copy command can move text between files, including different applications files. Typically, layered commands such as search and replace have few options available. The document must be manually reformatted, paragraph by paragraph, after any substantial editing.

The program's spelling checker doesn't measure up to the latest crop on the market. First you choose to Spell either a paragraph or a document. This process flags potential misspellings. Next you must select "correct spelling" to stop at each flagged word and correct your errors. Finally an Unspell command removes any lingering flags. The spelling checker offers no alternative spelling choices, and, unlike *First Choice*'s spelling checker facility, it does not span the other applications. Adding custom words to the spelling checker requires creating a separate text file.

Specific print drivers are not included in the program's installation. You must submit the control codes for print enhancements such as bold and underlined. Once you submit the print codes to the program, it will remember them.

**DATABASE** The database is a full-fledged relational database, with the power that implies. Unlike *First Choice*, *Able-One* also offers extensive data validation. You create the database form by specifying the type of data: alpha, integer, or numeric. Brackets signal the beginning and the end of the fields.

Data can be sorted by primary and secondary fields. The database can accommodate unique items, linked fields, calculated fields, and others. *Able-One* can sort data before printing, but the search criteria are specified under the print menu, similar to the word processor.

Creating a database with *Able-One* was reasonably painless. The program allowed me to read an ASCII file into the word processing component. Next I created my database form and attached my word-pro-

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cessed information. The program's search-and-sort capabilities are robust, and the ability to calculate a database field is an important step up in sophistication from *First Choice*.

**SPREADSHEET** The spreadsheet, though marred by the user interface, is full-featured. In fact, only *Able-One* and *Electric Desk* could import data from the database or ASCII document and parse the

data into the appropriate columns within the spreadsheet. Cursor movement and calculations are fast and fluid.

As in the database, spreadsheet entries are validated. Cells contain a specific type of information. Sophisticated cell referencing and formula capability make this a powerful spreadsheet for a bargain price. Unlike *First Choice*, *Able-One* allows you to copy a single cell into a range of cells.

One of the nicest spreadsheet features is the incorporation of colors to highlight a specific area of data. You can use seven color choices in the spreadsheet to give a colorful, visual aura to your data. *DeskMate/PC* has the same color feature, but with *Able-One* the color scheme migrates into the graphics as well.

The graphics component is very much intertwined with the spreadsheet application. You can select pie, bar, and scatter graphs from a graph option on the spread-

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from the large scrolling menu. The time-consuming process should be merged into a series of interactive queries.

A language for creating simple log-on scripts is available, but the lack of auto-learn or diagnostics makes this package a weak part of the chain.

## DOCUMENTATION AND SUPPORT

*Able-One's* documentation is thorough. Simple examples quickly shed light on the less-than-obvious nuances of the program.

The organization of the document mimics the program, though, and therefore, unfortunately, information is sometimes hidden where you'd least expect it. In addition, the manual's index is useless. *Spell* is not indexed. *ASCII* appears before *arc tangent* and *absolute value*, and there are other omissions.

Fortunately, I found the support people honest, direct, and knowledgeable, and the customer support policy is extensive.

## UNFULFILLED POTENTIAL

*Able-One* has potential; each application exhibits solid features, and the data integration is fairly sophisticated yet manageable. The multitasking potential is alluring.

Still, after inspecting the components, I find the user interface tedious and the word processing and telecommunications components weak. The price probably can't be beat, but the cost of aspirin for the headaches incurred may not be worth it.

## DeskMate/PC

The Tandy *DeskMate/PC* packs an enormous amount of functionality into its single-disk program. Of all the packages I reviewed, this one, with its word processor, spreadsheet, database, telecommunications, calendar, and mail system, most closely approximates a full-blown integrated workstation and eliminates the need for other software packages.

In addition to the main applications, the Tandy program includes helpful desktop subfunctions, including a calculator, an alarm clock, and a phone directory with auto-dialing.

The comprehensiveness of *DeskMate/PC* is appealing. The opening program screen is excitingly holistic in its approach to data organization. The color display is



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PERSONAL COMPUTING, April '86

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Requires: 256K RAM,  
two disk drives, DOS 2.0

or later.

In Short: Software to manage the complete desktop, including spreadsheet, word processing, database, telecommunications, calendar and alarm, pop-up calculator, and auto-dial phone directory. Designed for the Tandy 1200 series, but 100 percent IBM compatible. Not copy protected.

CIRCLE 609 ON READER SERVICE CARD

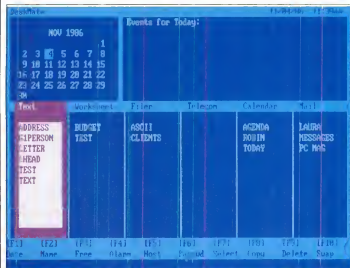
richly customized as you select foreground and background color of the screen and the pop-ups. After 5 minutes, the screen display automatically disappears, and a scrolling Tandy message arises to save you from display screen burn-in.

The handsome opening screen includes a calendar of the month, an events-for-today window, and a six-column directory showing you which files are contained in which of six applications: text, spreadsheet, filter, communications, calendar, and mail. You enter program commands by using the function keys alone and in combination with the Alt key, but finding the key combination is no mean feat. It would be nice if toggling the Alt key displayed the Alt functions.

All entry signs point to an exciting package, but unfortunately it's a downhill course from the opening screen. The standalone applications are bereft of features, and despite the bare-bones applications, the individual programs have little consistency in their commands and virtually no shared data.

One problem is the noticeable lack of hierarchical menuing, much like AbleOne's problem. Flat menus limit the number of commands and options available. In turn, this limits the number of commands available. Users can import ASCII files to disk after they rename them with the DeskMate/PC .DOC extension. The program's performance is further marred by rigidities such as the inability to use

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DeskMate/PC offers a main menu that is both a calendar and a file directory. The desktop environment also features telecommunications ability.

pathnames or to exit without a forced save.

DeskMate/PC has a simple continuity between applications. Block Copy and Move commands, for example, operate in the same manner from application to application. Printing is done primitively but consistently using Shift-PrintSc to print the screen and Ctrl-PrintSc to print a document. You can specify other printer-control options before printing, but they tend to be elementary.

**WORD PROCESSOR** DeskMate/PC's word processing features are so minimal that I found myself frantically searching for possible hidden commands. It seemed incomprehensible that the program's ten function key commands did so little. There is no ruler line, tab setting, undelete, centering, bold, or underline—the list goes on and on. The word processor is hardly more than an advanced note writer.

What is available? The program offers a simple search-and-replace function. And you can toggle between Add and Replace commands. DeskMate/PC's equivalents of insert and overtype. It took me a while to remember that Replace meant overtype and was not to be confused with search ac-

tivity. The only option under the Format command was document width.

Text selection and blocking within the document is reasonable, but moving data to other applications could be easier. When you specify the Copy command, the program asks you where you'd like to copy the data to but expects you to rely on human memory to transfer data to another file. Otherwise you can trudge back to the main menu, memorize the name of your desired file destination and reenter the processor. One of the greatest omissions for integrated use is the lack of any mail-merge or report-generation facilities.

**DATABASE** The database component is stronger. Again, the command line uses the same ten function keys, though they are used quite differently. Presented with a blank form, you type in your data label, and a marker automatically delineates the field area. Fields can be specified alpha or numeric, and indexing on key fields is supported. One unusual feature is a packing command that increases the efficiency of your database following numerous modifications.

Again, the database offers little to crow

about, and it is rigid. Entry screens are always in overstrike mode, text fields are always left-justified, and numeric fields are inescapably right-justified. The program offers no calculated fields and no report-generation capabilities.

**SPREADSHEET** The spreadsheet uses a function-key command line similar to that of the database. Like *First Choice*, DeskMate/PC offers no graphics in its spreadsheet component. The spreadsheet's rows and columns are both numbered, a common situation that many users find confusing. When you refer to a location you must specify, for example, R2,C3; hence, much more typing is involved than with I-2-3-like specification.

Also, formula calculations cannot be done automatically. Instead you press F2 to manually calculate the spreadsheet, which is a modest 99-by-99 affair.

The spreadsheet function validates cells for data type, and it has a fair number of data formats (yet it offers no automatic date entry or centering). Mathematical and formula operations are relatively plentiful. Color monitor users can highlight cells or ranges in color. Despite size limitations, the spreadsheet is one of DeskMate/PC's stronger applications.

**TELECOMMUNICATIONS** The telecommunications component is reminiscent of the "you've got to be an expert to use it" era of software. Seldom have I seen such an intimidating procedure. After a comparatively straightforward telecommunications status screen, you are plunged into defining the parameters for voice, computer, and answer modes. The module has quirks and gets "hung up" after the initial status screen. Log-in scripts have never been easy to create, but DeskMate/PC's lack of documentation on the subject plus the extreme detail necessary to create a DeskMate/PC script makes it a Sisyphean task. DeskMate/PC's telecommunications module makes you thankful for other packages.

The calendar is a handy and powerful event-scheduler, but it has no integration with the alarm feature. Believe it or not, you have to remind yourself to remind yourself with the alarm by rekeying the calendar information in an alarm file. The

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### Integrated Software: Summary of Features



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	<b>Able-One</b> Able International Inc.	<b>Electric Desk</b> Alpha Software Corp.	<b>FFS: First Choice</b> Software Publishing Corp.	<b>Words &amp; Figures</b> Lifetree Software Inc.	<b>Deskmate/PC</b> Tandy/Radio Shack
List price	\$84.95	\$129	\$149	\$195	\$199.95
Applications					
Word processor	●	●	●	●	●
Spreadsheet	●	●	●	●	●
Database	●	●	●	○	●
Graphics	●	○	○	●	○
Telecommunications	●	●	●	○	●
Number of disks	1	3	2	3	1

#### GENERAL FEATURES

Windows	● (up to 20)	● (2)	○	●	○
Commands	Pop-up	Command line	Pull-down	1-2-3-style	Pull-down
Speed key	●	●	●	○	○
Desktop features	Calculator, speller	Speller, thesaurus	None	None	Mail, calendar, phone list, calculator
Imports/exports ASCII files	●	●	●	● (in WP only)	●

#### WORD PROCESSOR

Mail-merge	●	●	●	○	○
Mailing labels	●	●	●	○	○
Links documents	●	●	●	●	●
Headers/footers	●	●	●	○	○
Criteria for search	Forward, whole and partial word	Forward, whole and partial word	Forward, whole and partial word	Forward, backward, whole and partial word	Forward, whole word

#### SPREADSHEET

Reads .WKS files	●	○	○	●	○
Maximum size	8,000 cells	2,048 rows × 256 cols.	Limited by memory	9,999 rows × 256 cols.	99 rows × 99 cols.
Supports 8087	○	○	●	●	○

#### DATABASE

Number of fields	Unlimited for one screen	Limited by memory	1,000	9,999	Limited by memory
Imports files	● (from WP or in ASCII)	● (in ASCII)	● (from WP)	○ (no data parse*)	○
Report generator	● (within WP)	● (within WP)	● (in report module)	None	None
Free-form or valid format	Alphanumeric	Label, data, comment	Free-form	1-2-3-style	Alphanumeric
Calculated fields	○	●	○	●	○
Graph types	Bar, pie, scatter, line	None	None	Bar, pie, scatter, line	None

#### GRAPHICS

Insertion in text	○	○	○	○	○
-------------------	---	---	---	---	---

#### TELECOMMUNICATIONS

Protocols	XON/XOFF, CTS RTS	XON/XOFF	XON/XOFF, PC-to-PC	None	XON/XOFF, user-defined
Scripts	Script language	Script language	Automatic	None	Script language

#### DOS FACILITIES

Directory by application	○	●	●	●	●
Path names	○	●	●	●	●
Backup	○	○	○	● (optional)	○

—Indicates Editor's Choice    ●—Yes    ○—No

\*Reads entire ASCII file into one database record only.

## ■ INTEGRATED SOFTWARE

mail feature provides an electronic messaging environment similar to MCI Mail. Your messages are stored with the date and author's name and title. You may configure mailboxes for incoming and outgoing messages and search for particular messages. The feature is helpful within an office environment, but most commercial services already have somewhat similar environments. The phone directory with auto-dial capabilities rounds out this desktop approach. None of the features in this package merit a jog down to the local Radio Shack, but, if you own a Tandy machine and purchase the program as a special Tandy bundle, it's a good bargain.

■ **DeskMate/PC's** word processing features are so minimal I found myself searching for possible hidden commands.

### DOCUMENTATION AND SUPPORT

The documentation is divided into two sections: a reference manual and a tutorial. There's a great deal of shuffling between the two sections trying to piece together the story. In *DeskMate/PC's* case, a brief manual is inadequate. The document never discusses how to integrate the various components. Tandy support is available, but getting it can involve a circuitous route.

The Tandy *DeskMate* product line is a full series of similar integrated packages. The original *DeskMate*, for the Tandy 1000 series, is now obsolete. It's been replaced by the *DeskMate II*, which is bundled with MS-DOS for the Tandy 3000 (separately, \$199.95; bundled, \$99.95). At review time Tandy was about to release *DeskMate II*; this version will have the same task-switching functions as *DeskMate/PC*, plus an enhanced calendar and a new DOS feature for remote users and other improved-performance features. *DeskMate/PC*, designed for the Tandy 1200 series, is the package reviewed here. There is also a *Personal DeskMate*, for the

# the Art of Visual COBOL

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In addition to providing impressive artistic capabilities, Visual COBOL also gives you high-speed native 8086 machine code, a lightning quick SORT, extended CHAINing features, a new interactive debugger, execution of DOS commands, multi-keyed ISAM structure, ANSI compatibility, GSA certification, and much more. Versions that support XENIX, UNIX, and both the IBM and Novell networks are also available.

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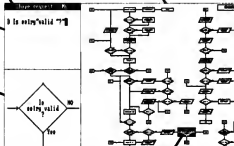
The sample screen display shown below is typical of what you see while editing a chart. Other screen displays are provided for entering titles, changing options, getting "help" and so on.

STATUS BAR (not to be confused with a wet bar) tells you what Interactive EasyFlow is doing at all times.

TEXT/MESSAGE WINDOW used to enter user text and to display messages from Interactive EasyFlow.

CURRENT SHAPE WINDOW - shows the content of the current flowchart shape (the one under the SHAPE CURSOR) in complete detail.

CHART WINDOW gives an overview of your chart; this example shows the "normal" view. "Close-up" view shows a smaller part of the chart in more detail. "Wide-angle" view shows a larger part of the chart at reduced size.



SHAPE CURSOR shows where you are in the chart. Cursor keys move it around; chart window scrolls if you run off the edge of the window.

CIRCLE 201 ON READER SERVICE CARD

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## ■ INTEGRATED SOFTWARE

1000EX series. If you decide you want a *DeskMate*, be sure the right one finds its way to your desk.

### Electric Desk

Alpha Software's *Electric Desk*, Version 1.1, is an old standby (previously Version 1.04) with a few wrinkles lifted and a modern-day pricing scheme. One of the early contenders for integrated desktops, *Electric Desk*, at its \$350 price, was originally hard to swallow. But now the price has been dropped to \$129, and the features have been enhanced and refined.

This program has considerably more functionality than *PFS:First Choice*, yet it still manages to preserve a lucid user interface. Unlike the packages that have an outstandingly weak module, *Electric Desk* is uniformly even throughout the applications, and its modules maintain an even, high-quality keel. My preference is for *First Choice*'s uncluttered design and aesthetic levels of menuing, but if you want a bit more power and integration, *Electric Desk* merits your attention.

**A SERVICE ORGANIZATION** *Electric Desk* refers to its applications as "services." Its services include its word processor, database, spreadsheet, and telecommunications program. Optional enhancements include a remarkably good spelling checker and a fine thesaurus licensed from Microlytics, the maker of *Word Finder* (see Editor's Choice in "Electronic Thesauri: Four Ways to Find the Perfect Word," *PC Magazine*, Volume 6 Number 1).

The display screen provides a complete command shell for both the current application and the alternative services simultaneously. The top one-quarter of the screen lists applications-specific commands. The bottom line offers a service menu of the others, including a help screen and a reentrant exit to DOS. You can opt to turn the menu display off; however, all but the most experienced user will need the menus close at hand.

The *Electric Desk* philosophy requires that you open service windows for each new activity and close them when your work is done. It is possible to have as many as nine service windows open at once,

## ■ INTEGRATED SOFTWARE

PC  
MAGAZINE

## FACT FILE



**Electric Desk,  
Version 1.1**  
Alpha Software Corp.  
30 B St  
Burlington, MA 01803  
(617) 229-2924  
List Price: \$129  
Requires: 256K RAM,

two disk drives, DOS 2.0 or later.

In **Short:** An integrated database, word processor, spreadsheet, and telecommunications package that is capable of sharing data, as well as in a common user interface. Can open as many as nine files at once. Optional spelling checker and thesaurus available. No copy protection.

CIRCLE 693 ON READER SERVICE CARD

even though you can view only two windows at a time on the display screen. While not quite as confusing as *Able-One's* windows situation, this preponderance of open applications is an invitation for trouble. Unlike *Able-One*, *Electric Desk* maintains applications-specific file directories; when you invoke the database, you see only a pop-up menu of database files.

A number of alternatives for issuing a command are available. You can use the cursor, the function-key commands, or the initial letter of the command.

In addition to commands being well integrated (for example, the F7 key always pertains to File/Print commands), the data is shared to a large degree. Database, word processor, and spreadsheet can all handle ASCII imported data provided that the filename meets the eight-character *Electric Desk* limitation. The spreadsheet and the database handle DIF imports and exports as well. *Electric Desk* is one of the few packages that allowed me to integrate between the database and the spreadsheet. Mail-merges for the database and the word processor were easy to use.

**WORD PROCESSING** The *Electric Desk* document service, as it is called, handles a full spectrum of word processing activity. With its use of embedded formatting commands, the document service is quite capable of handling large and complex documents. Without the embedded

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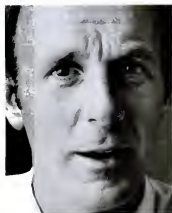
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**3:37:** *"Now I can get whatever I need. I'm very well connected."*

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CIRCLE 194 ON READER SERVICE CARD

## SLOUCHING TOWARD PRODUCTIVITY: INTEGRATED VS. STANDALONE ROUTES

*Should you take the road marked "integration" or the one called "standalone"? Some milestones, speed limits, and warning signs can help you map your way.*

When Robert Frost wrote about the "road not taken," he must have been thinking about PC users.

Traveling the integrated road, PC users opt for programs that share the same command structure and usually have some, albeit primitive, degree of data integration. The ever lower cost of these new integrated packages increases their appeal because it makes it possible to get as many as five applications for the price of only one.

Traveling a standalone route, users are left with five, typically more-powerful, applications. Not only do the programs speak different command languages, but typically they can't share data.

Both these roads are only temporary highways—until software gets much smarter and more capable of coexisting with other applications.

What factors should influence your decision to take the standalone or the integrated road? Here are some of my milestones, speed limits, and warning signs.

### MONITORING A DAY'S WORK

Many PC users, tracking their work for a given day, conclude that they don't need total integration. Very few people use all five applications (word processing, database, telecommunications, spreadsheet, and graphics) in a day.

A more typical scenario is to use two

applications intensively. Most users require integration between only two primary applications. Assess your needs before you buy.

Generally, standalone packages have more features than their integrated counterparts. Integrated packages, especially the low-cost ones, must skimp on features to avoid overwhelming users, to simplify the simple/integrated command structure, to share as many resources as possible, and to stay within reasonable memory limitations.

Standalone applications can provide a depth of command features not typically found in integrated packages. The integrated programs that do have a plenitude of features, such as *Symphony* and *Framework*, are too difficult for most users. The integrated packages reviewed in this article, on the other hand, are easy to use, but all suffer from a lack of features when placed head to head with standalones. Are you more interested in features or in simplicity?

### MAINTAINING EXCELLENCE

Integrated packages are erratic and tend to have weak and strong modules. It's almost a given that if the database module is tremendous, the telecommunications module is horrendous.

When you buy individual, nonintegrated applications, you maintain control and achieve a degree of customization

unequaled with that of integrated packages. You set your own performance standards. But, you must also pay more and learn different interfaces.

### GAUGING THE WORK'S SIZE

Integrated packages are best for doing small integrated tasks. Small databases, small spreadsheets, and small documents are manageable with these packages. Work of any major proportion is a more difficult undertaking.

If you are writing a book, you will want the capability of a standalone processor's formatting and document-structuring commands. If you are maintaining multiple databases, linking various fields, and generating large reports, then you'll need a database with power unequalled in any of these programs.

### PRICING THE COMPONENTS

Integrated packages are the hands-down winners of the price wars. With any of the integrated packages reviewed here, you would be hard-pressed to find the equivalent functionality in five individual applications for an equivalent price.

In the here and now, integrated packages are sort of a Band-Aid, a temporary solution, to help you handle various tasks. In the future, multitasking—in whatever manifestation it appears—will be the direct route to true integration.

—Robin Raskin

commands, it is a completely menu-driven module.

Cutting and copying blocks of text is a streamlined process. Text can be cut to a buffer and inserted anywhere across the applications. *Electric Desk* offers multiple storage buffers, a powerful feature unique to this class of product.

The program is by and large

WYSIWYG. An unusually large array of type styles are user selectable, though most users will find their printers incapable of performing the selections. Page layout is done interactively, with the user retaining a reasonable amount of control. Text can be imported to the spreadsheet, and the document service serves as the hub of form-letter and report generation.

**DATABASE** *Electric Desk's* database creation is unusual. A field consists of a label, data, and comments. You select a field from a menu of function keys. Each type of field format can have a print style attached, and you can format your own data field types as well. In theory, the approach makes sense, but in actuality, you spend too much time toggling function

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## ■ INTEGRATED SOFTWARE

The screenshot shows the Electric Desk software interface. At the top is a menu bar with options: File, Edit, Format, Window, Help, and a pull-down menu for 'Tools' containing: Toggle underline, Set type style, Search and replace, Write/Print commands, Document Commands, and Environment Commands. Below the menu is a letter template with the text: 'Dear Sir/M', 'How nice it is for us to have this opportunity together and conduct out business. I'd like to do a mail merge with you and present results to our customers.', and a date stamp 'FRI, 11 FEB 1984'. At the bottom is a spreadsheet with columns QTR 1, QTR 2, QTR 3, QTR 4, and a total column. The rows are: NET SALES, C.O.G.S., DISCOUNTS, SHIPPING, and GROSS MARGIN.

	QTR 1	QTR 2	QTR 3	QTR 4	
NET SALES	11000.0	15000.0	18000.0	19000.0	
C.O.G.S.	6200.0	5600.0	9572.0	9734.0	
DISCOUNTS	800.0	500.0	700.0	750.0	
SHIPPING	120.0	150.0	150.0	155.0	
GROSS MARGIN	3880.0	5749.0	7558.0	8361.0	

The Electric Desk database is a good text-based database. Data can be exported in DIF format and imported into the spreadsheet for mathematical computations. Then the spreadsheet can be merged with a document. Throughout the process, the commands are consistent.

keys to visualize appropriate data types. However, the control over the format enables you to create attractive printed reports.

*Electric Desk* handles multilevel indexing and searching well. The search language is complete, and multiple searches on multiple criteria are possible. Mail-merges, reports, and form letters are handled through a batch merge process with the word processor.

The database is limited in its capacity to modify the original database design. The only way to modify is to create a new database based on the old and then incorporate the changes. And, the database cannot perform calculations on fields.

**SPREADSHEET** The spreadsheet is another *Electric Desk* component that maintains a nice balance between a power-user and an oversimplistic approach. Respectably sized at 2,048 rows by 255 columns, the spreadsheet is exceptionally useful because it can handle DIF import and export. *Electric Desk's* spreadsheet also shows its muscle with extensive trigonometric functions, keyboard macros, and useful fea-

■ *Electric Desk's* spreadsheet shows its muscle with extensive trigonometric functions, keyboard macros, and suppressed columns.

tures such as suppressed columns.

The spreadsheet offers a sophisticated sort on three keys. The commands are intuitive and hierarchically organized. The viewpoint and overlay functions allow you to work effectively with large spreadsheets, by creating view windows into different parts of the spreadsheet.

**TELECOMMUNICATIONS** The telecommunications component is adequate, albeit the weakest link of the *Electric Desk*

chain. The menu is as similar as possible to the others.

A set-up communications screen allows you to select the parameters for communications. Log-in scripts may be created quickly with the inclusion of ready-to-use special symbols and commands.

### DOCUMENTATION AND SUPPORT

The documentation is good, even though the program's most recent release is available with an insert addendum, which makes page shuffling necessary.

The support staff I spoke with were knowledgeable, courteous, and prompt, and they knew the nuances of the program to get it to perform with maximum efficiency.

### COMMENDABLE CAPABILITIES

*Electric Desk* is a capable, well-organized package that offers considerable consistency and data sharing between its applications.

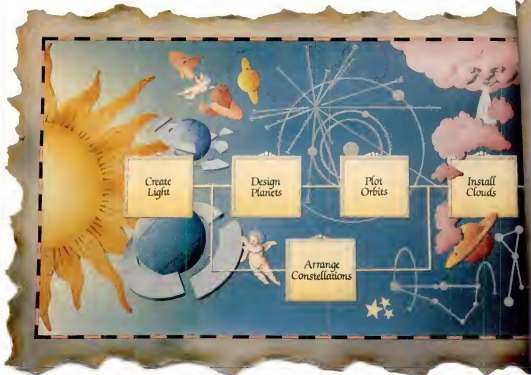
I debated long and hard between the merits of this program versus *PFS:First Choice* before selecting an Editor's Choice. The trade-off: for the more powerful features of *Electric Desk* you must sacrifice the intuitive user interface of *PFS:First Choice*.

### Summing Up

Integration is ultimately a matter of personal criteria and, as in the rest of the computer buyer's world, there are trade-offs to be considered. *PFS:First Choice* is long on beauty but falls short on power-user features. Learning *PFS:First Choice* is a delightful experience; learning the others is, well, an experience.

*Able-One* is clearly the most far-reaching in its support for the automated workplace, but it is hindered by awkward menu structure and the simplistic methods that DOS provides to cope with multitasking. *Able-One's* import and export facilities and its ability to integrate spreadsheet, database, and document are significantly more powerful than that of the other packages, and the price is nothing short of a steal.

Tandy's *DeskMate/PC* is complete, and it provides a great interface but suffers from a primitive execution. Flat menu



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CIRCLE 174 ON READER SERVICE CARD

## ■ INTEGRATED SOFTWARE



EDITOR'S  
CHOICE

*If it's integration you're hanker'ing for, PFS:First Choice gives it to you without the accompanying headaches. It's our first choice for those with modest integration needs. Buy PFS:First Choice in the morning, and you'll be doing real work by noon. The word processor and the telecommunications module are the program's star attractions, and the user interface is unusually clean and crisp.*

*Electric Desk is a close second, however. It's clearly more powerful than PFS:First Choice but has a more complex user interface.*

commands offer no depth of options. Tandy users will appreciate its bargain price when purchased with a Tandy machine, but others will find it no bargain. Alpha's *Electric Desk* gives you your cake (numerous applications) and lets you eat it too (thanks to its power features). The only drawback is that the visual impact of so many options and features is overwhelming. Novices with too many files on the fire at once tend to get burned. Lifetree's *Words & Figures* fits the bill for users whose idea of integration stops at a 1-2-3 look-alike and word processor combo.

My advice is to pick an integrated package whose core application reflects your data needs. Also, make sure you use all the integrated components enough to justify integration versus the standalone route. No doubt, as the standard 256K-byte memory configuration evolves to 512K, we'll see more features and better user interfaces in integrated packages. Meanwhile, consider these packages a great way to stick your toes in the integrated waters.

It's not easy to create a series of applications that share a command structure, are easy to use, have loads of features, and can share data—especially for under \$200. Kudos to the manufacturers who give it their all.

*Robin Raskin is a frequent contributor to PC Magazine.*

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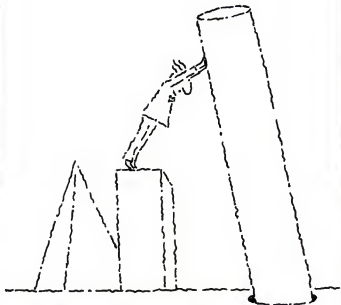
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# PRODUCTIVITY

■ PC LAB NOTES: ERRORLEVEL RETURN CODES ■ JEFF PROSISE

## ADDING POWER TO BATCH PROGRAMS

*By using ERRORLEVEL return codes, CHECK.COM lets your batch files test a wide variety of useful parameters and make intelligent branching decisions.*

The ability to run batch files is one of the more attractive features of PC/MS-DOS. A batch file is simply a collected sequence of DOS commands that run under the operating system as a program. Batch files allow you to automate repetitive tasks; they also insulate novice users from command line jitters. At the same time, however, batch files are often a source of frustration, for their programming language severely limits their ability to communicate with executable files and lacks the control of flow structures and facilities that characterize a true programming language.

A batch program can invoke executable files and, to a limited extent, other batch files; it can make use of the primitive ECHO command to write text to the display; it can receive parameters passed from the command line, and it can exercise a very limited decision-making ability through commands like IF, FOR, and GOTO. But that's just about it. The ERRORLEVEL parameter built into the batch command IF allows running programs to return an exit code on termination, but only a handful of DOS commands make use of that code.

What happens if, for example, you want to create a batch file to load and run a certain program, but you have two versions of that program, one for an Enhanced Graphics Adapter (EGA) and one for a Color Graphics Adapter (CGA)? DOS gives the batch program no way of finding out what kind of display adapter is installed in the system, so the only solution is to write a custom executable file that

checks the video hardware and somehow passes that information back out to the parent batch program. What if a batch file needs to know which of two versions of a program to run, based on whether or not a math coprocessor is installed? Or which version of DOS is installed, and on what type of computer? What if you want a batch file to perform disk operations like COPY or DEL based on the amount of disk space available? The list of reasonable and desirable things DOS batch files can't do goes on and on.

Fortunately, there is a way to lend DOS a hand without resorting to system-level programming. CHECK.COM is a DOS

utility designed to supplement the usefulness of batch files by letting them peek under the hood and look at a variety of parameters that range from free disk space to installed hardware to the time and date. Your batch programs can make intelligent decisions based on the results reported by CHECK through the ERRORLEVEL code. If you ever use batch files to shorten your day, you may find that CHECK lets you go home right after lunch.

**GETTING CHECK** The sidebar "Downloading CHECK" explains how to obtain CHECK.COM, CHECK.ASM, or CHECK.BAS by modem from the free PC Magazine Interactive Reader Service. If you prefer to key the program in for yourself, Figure 1 contains the assembler source code for the program, and Figure 2 is a BASIC program that will create CHECK.COM for you.

**USING CHECK** You should think of CHECK as an addition to the existing set of batch commands like IF, PAUSE, ECHO, and the rest. The syntax for the utility is

CHECK keyword [parameter1 parameter2 ...]

where *keyword* is one of the program's built-in function specifiers, and is followed by any entries (parameter1, etc.) required for that call. The sidebar "CHECK at a Glance" gives a complete list of the 16 keywords that are supported, the required command line parameters, and the values that are returned. By way of example, fol-

### PRODUCTIVITY INDEX

#### PC LAB NOTES

A DOS utility that lets batch files test a variety of parameters

#### PROGRAMMING/UTILITIES

Insert the current date and time in your documents with TIMEKEY.

#### SPREADSHEET CLINIC

Wipe out columns, print banners, and calculate print range width.

#### TURBO POWER USER

Alter Turbo Pascal's colors and access current Shift key states.

#### USER-TO-USER

Reset the AT's clock and create true batch file variables.

#### PC TUTOR

Add color to DOS command displays and redefine keys with ANSI.SYS.

## ■ PC LAB NOTES

lowing is a short batch program that uses **CHECK** to print a greeting message appropriate for the time of day:

```
ECHO OFF
CHECK TIME
IF ERRORLEVEL 18 GOTO EVENING
IF ERRORLEVEL 12 GOTO AFTERNOON
ECHO GOOD MORNING!
GOTO END
:AFTERNOON
ECHO GOOD AFTERNOON!
GOTO END
:EVENING
ECHO GOOD EVENING!
:END
```

Here's what it does: **CHECK TIME** returns the current hour (0-23) to the batch process through **ERRORLEVEL**. The **IF ERRORLEVEL** statements test the return code and branch to the labels **EVENING** and **AFTERNOON**, where if the hour is greater than or equal to 18 or 12, respectively, the proper greeting is output. If both tests fail, then the "Good Morning!" message is printed. Labels are denoted in batch files with preceding colons. Depending upon the value reported by **CHECK**, then, the batch process can make a decision about where to go and what to do.

The only way DOS provides for interrupting batch execution to query the user for a keystroke is through the PAUSE command. Execution continues, however, when any key is pressed. With CHECK, you can narrow the options a bit. The following batch program pauses and waits until the user presses the Spacebar, endlessly looping while other keys are pressed:

```
ECHO OFF
ECHO PRESS SPACE BAR TO CONTINUE
GOTO START
:ERROR
ECHO NO, I SAID HIT THE SPACEBAR
:START
CHECK KEYPRESS
IF ERRORLEVEL 33 GOTO ERROR
IF NOT ERRORLEVEL 32 GOTO ERROR
```

**CHECK KEYPRESS** returns the ASCII code of any key pressed. If the code is 33 or higher, execution loops back to the label **ERROR**. The statement **IF NOT ERRORLEVEL 33** rejects the appeal to continue if the ASCII code is less than 32. Apart from the message, only two program lines are needed to limit the action that must be taken to proceed to one specific

```

CHECK.COM FOR THE IBM Personal Computer - 1986 by Jeff Prosser
                                .s887      ;#cognize 0087/0027 instructions
code      segment para public 'code'
          assume cs:code,ds:code
          org 100h
begin:    jmp check
; notices
notice_2  db ' Copyright 1986 Tiff-Davis Publishing Co.'
          db ' Programmed by Jeff Prosser'

keywords  db 'MEMORY',0,'FILESYS',0,'VIDEOCARD',0
          db 'MODEL',0,'0087',0,'0027',0
          db 'FILEPOUND',0,'FILETEXT',0,'DISKSPACE',0
          db 'VIDEOMODE',0,'TIME',0,'DAY',0,'MONTH',0
          db 'VERSION',0,'KEYBOARD',0,'KEYPRESS',0

; jump_table
          dw offset keypress      ;vector dispatch table
          dw offset keyboard
          dw offset version
          dw offset month
          dw offset day
          dw offset time
          dw offset videomode
          dw offset diskpace
          dw offset filetext
          dw offset filesfound
          dw offset methproc
          dw offset methproc
          dw offset model
          dw offset videocard
          dw offset filekeys
          dw offset memory

;
; IBM
parameter_count  db 'IBM'
string_length    dw 0
file_handle      dw 0
command_index    dw 0
keyword_buffer   dw offset endprog
param_buffer     dw offset endprog+16
text_string      dw offset endprog+144
dis              dw offset endprog+272
control_bytes    label byte
                db 0
;
ermag1           db 13,10,'Invalid Keyword',13,10,'$'
ermag2           db 13,10,'Missing Parameter',13,10,'$'
ermag3           db 12,10,'Invalid Drive Specifier',13,10,'$'
ermag4           db 13,10,'Invalid String Specifier',13,10,'$'
ermag5           db 13,10,'File Not Found',13,10,'$'

check           proc near
              cld
              call parse_line
              cmp parameter_count,0
              jne check1
              lsh dx,ermag2
              jmp short1
              lsh cx,keywords
              mov cx,16
              mov di,keyword_buffer
check2:         lodsb
check3:         or al,al
               jnz match_found
               scasb
               js check3
               dec cx
               jcxx error_exit
               jnz al,al
               jns check4
               jmp check2
;
; Execution comes here when the keyword entered on the command line matches one
; of the recognized keywords. The count in CX is translated into a pointer to
; the address of the routine to be vectored to.
;
match_found:    mov bx,cx
               dec bx
               shl bx,1
               jmp word ptr cs:[offset jump_table+bx]

;
; Execution comes here when an error is encountered.
;
error_exit:     lsh dx,ermag1
error:          push dx
               ;load address of error message
               ;SIBS ERROR return code in AL

```

(continued)

**Figure 1:** The assembly language program for CHECK.COM

# GET SERIOUS



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CIRCLE 172 ON READER SERVICE CARD

## ■ PC LAB NOTES

```

mov ah,9          ;DOS function - Print String
int 21h           ;print error message
pop ax            ;retrieve return code

;EXIT is the common point of exit for all routines in the program. A return
;code is set that can be read as the ERRORLEVEL parameter by batch processes.
exit:
mov ah,4Ch        ;DOS function - Exit Program
int 21h           ;exit with return code
check
endp

;Model routine returns the machine ID byte of the computer being used.
model
proc near
mov ax,8F000h     ;set ES to ROM segment
mov es,ax
mov di,8FFFh      ;load DI with offset of ID byte
mov al,es:[di]    ;get machine ID byte into AL
jmp exit
endp

;VideoMode routine returns the current video mode (8-16).
videomode
proc near
mov ah,15         ;INT 15h function - Get Video Data
int 15h           ;get video mode in AL
jmp exit
endp

;VideoCard routine returns a value indicating what kind of video adapter is
;being used in the system (0=MDA, 1=CGA, 2=EGA).
videocard
proc near
mov di,2          ;initialize DI
mov bx,8C000h     ;set ES to EGA BIOS segment
mov es,bx
mov di,12h        ;set DI to IBH signature address
lea si,ibm        ;three bytes to check
mov cx,3          ;compare the three bytes
repe cmpb         ;this is an EGA - jump to exit
je card1          ;adjust DI for MDA or CGA
dec di            ;get current video mode
mov ah,15         ;is it mode 7?
int 15h           ;no, then this is a CGA
cmp al,7          ;zero DI for MDA
jne card1         ;set AL for exit
dec di            ;end exit
mov al,di         ;end exit
card1:
jmp exit
endp

;Memory routine returns the number of 16K RAM modules present in the system.
memory
proc near
int 12h           ;get memory size from BIOS
mov cl,4          ;set CL to 4 for shift
shr ax,cl         ;shift 4 times to divide by 16
jmp exit
endp

;FileFound returns # if the indicated file is found, 1 if it's not.
filefound
proc near
cmp parameter_count,1 ;more than 1 parameter entered?
je filefnd1       ;yes, then continue
lea dx,errormsg2   ;no, then get error msg address
mov al,1          ;set AL to 1 to indicate failure
jmp error1        ;end exit
filefnd1:
mov dx,param1_buffer
mov ah,30h        ;point DX to filename
xor al,al         ;use DOS Open File function
int 21h           ;set AL to # for read-only access
jnc filefnd2      ;attempt to open the file
open procsecc      ;open process succeeded
open failed - set AL to 1
jmp exit
filefnd2:
mov bx,es         ;get file handle in BX
mov dx,CloseFileFunction ;use DOS Close File function
rclose file just opened
xor al,al         ;zero AL for exit
jmp exit
filefound
endp

;Keyboard routine returns 1 if a key has been pressed, 0 if one has not.
keyboard
proc near
mov ah,1          ;use BIOS to check buffer
int 16h           ;get status of keyboard buffer
je kbl            ;empty if 0F set

```

(Figure 1 continues)

ic key. As shown in the sidebar "Constructing a Batch Menu System," you can use KeyPress to create a batch file that accepts and acts on specific keystrokes that correspond to listed menu choices.

As you can see, ERRORLEVEL is the basis of CHECK's ability to communicate with a running batch program. That's really the only line of communication available. If you're rusty on the IF ERRORLEVEL specification, you can brush up on it by scanning the batch commands section of your DOS manual or by reading the sidebar "The ERRORLEVEL Parameter," which summarizes its uses and capabilities. A 1-byte return code doesn't quite

■ A 1-byte return code doesn't provide all the flexibility we would like to have, but it's the best we can do with the operating system.

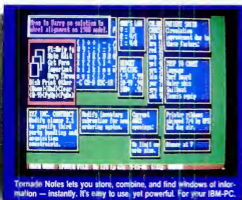
provide all the flexibility we would like to have, but it's the best we can do with current releases of the operating system, and it does, at least, allow us to push up the IQ level of a batch process.

**CHECK KEYWORDS** The 16 keywords that CHECK recognizes are divided into three categories: disk functions, hardware functions, and miscellaneous functions. One of the beauties of this utility is that, armed with the source code and a beginning-to-intermediate knowledge of assembly language programming, you can quite easily extend it with additional keywords and functions; I'll explain how to go about that later.

**DISK FUNCTIONS** Four disk-related keywords are provided: FileSize, FileFound, FileText, and DiskSpace. DiskSpace (you can enter the letters in any case or mixture of cases in a batch file) returns the amount of free disk space on the

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## ■ PC LAB NOTES

specified or default drive, in terms of whole 16K blocks. So, if there is 70K of room, DiskSpace returns a value of 4 to ERRORLEVEL, indicating there are four blocks free. FileSize reports the length of a given file in kilobytes. A value of 255 means that the length is 255K or greater. FileFound is essentially a duplicate of the operating system's IF EXIST conditional test and returns 0 if a file exists, 1 if it does not. FileText searches for a given text string inside a file and is invoked with the following syntax:

CHECK FILETEXT C:\TEXT.DOC "Once upon a time"

In this case, the file TEXT.DOC is opened on drive C: and is searched for any occurrence of the string "Once upon a time." If the string is found, a 0 is returned; if it's

## ■ FileFound essentially duplicates the operating system's IF EXIST conditional test and returns 0 if a file exists, 1 if it does not.

not, or if an error is encountered (invalid syntax or the failure to find the file, for example), a 1 is returned. When using this function, you must enclose the string to be searched for in single quotes, or a syntax error will be reported. FileText is included in CHECK for a couple of reasons: first, because it serves a legitimate purpose on its own; and second, because it provides an example of how user-written functions can make use of a third command line parameter (in this case the text string) even though the automatic parsing routine built into the program acts only on the first two.

**HARDWARE FUNCTIONS** Five hardware-related functions are included in CHECK. Memory, VideoCard, Model, 8087, and 80287 allow batch processes to check the amount of memory installed in

```

mov al,1                                ;not empty - set AL to 1
jmp exit
khl:                                     ;buffer empty - zero AL
xor al,0
jmp exit
keyboord
;
;keyPress returns wait for a keypress (if one isn't already buffered) and
;return it's ASCII code.
;
keypress proc near
mov ah,0                                ;use BIOS function to read keypress
int 16h
jmp exit
endp
keypress
;
;Version returns the major number of the version of DOS in use.
;
version proc near
mov ah,30h                              ;use DOS Get Version function
int 21h
jmp exit
endp
version
;
;DiskSpace returns the number of whole 16K blocks of free disk space from the
;indicated or default drive. AL is 0 on exit if an error is encountered. A
;return value of 255 means there are that many blocks or more free.
;
diskspace proc near
xor di,di                                ;set DI to 0 for default drive
cmp parameter_count,1                    ;only one parameter entered?
je dispac1                                ;yes, then use default drive
mov si,parameter_buffer                  ;set SI to parameter text
lodsb                                    ;get first character in parameter
sub al,64                                 ;convert to DOS drive designator
mov di,al                                 ;shift designator to DI
lodsb                                    ;get following character
je it_a_colon?                             ;is it a colon?
;yes, then continue
jno, then load error msg address
;set AL for failure
realt on error
;use DOS Get Free Space function
;get disk information
;drive designator error?
jno, then continue
;abort on drive error

dispac1:
mov cx,0FFFFh
jne dispac2
lea dx,errormsg3
xor al,0
jmp error1

dispac2:
mul cx                                    ;multiply to get bytes per cluster
mul bx                                    ;multiply again to get free bytes
mov cx,14
shr dx,14
for cx,1
loop dispac3
or ah,0h
je dispac4
loop dispac3

dispac3:
mov al,255
jmp exit
endp
dispac4:
diskspace
;
;Time returns the current hour of the day (0-23).
;
time proc near
mov ah,44                                ;get current time from DOS
int 21h
mov al,0h
jmp exit
endp
time
;
;Day returns the current day of the month (1-31).
;
day proc near
mov ah,42                                ;get current date from DOS
int 21h
mov al,dl
;put day in AL
jmp exit
endp
day endp
;
;Month returns the current month number (1-12).
;
month proc near
mov ah,42                                ;get date from DOS
int 21h
mov al,0h
;put month in AL
jmp exit
endp
month
;
;FileText returns 0 if the specified string is found within the indicated

```

(Figure 1 continues)

## ■ PC LAB NOTES

```

;file. A 1 is returned if the string is not contained within the file, if
;the file is not found, or if a syntax error is detected on the command line.
filetest      proc near
cmp parameter_count,2      ;set least two parameters entered?
je test1        ;yes, then continue
mov dx,errmsg2      ;no, then abort

test1:
mov dx,command_index
mov si,txt_estring
test2:
lodsb
cmp al,32
je test2
cmp al,39
je test4
cmp al,13
je test3
mov dx,errmsg2
mov al,1
jmp error1
mov dx,errmsg4
test3:
mov al,1
jmp error1
lodsb
cmp al,13
je test3
cmp al,39
je test5
clob
inc string_length
jmp test4
cmp string_length,0
jne test5
mov dx,errmsg4
mov al,1
jmp error1
mov dx,param1_buffer
test4:
mov ebx,30h
xor al,el
int 21h
jnc test7
mov dx,errmsg5
mov al,1
jmp error1
mov file_handle,ex
test5:
mov dx,dte
mov cx,0C000h
mov bx,file_handle
mov ebx,3fh
int 21h
cmp ex,estring_length
jb not_found
mov bx,ex
mov cx,ex
sub cx,estring_length
inc cx
mov di,dte
push cx
push di
mov cx,estring_length
mov al,txt_estring
cmpb cx,ex
pop di
pop cx
je test_found
inc di
loop test5
cmp bx,0C000h
jne not_found
mov al,42h
mov cx,0FFFFh
mov dx,estring_length
not dx
add dx,1
edc cx,0
mov bx,file_handle
int 21h
jmp test8
xor al,el
jmp cclose_file
not_found:
cclose_file:
mov al,1
push ex
mov ebx,30h
mov bx,file_handle
int 21h
pop ex
jmp exit

;point SI to end of second param
;point DI to string buffer
;get next character
;is it a space character?
;yes, then go back for another
;is it a quote mark?
;yes, then branch and continue
;end-of-line marker?
;no, it's an invalid character
;abort - string missing

;abort = syntax error in string

;get character in string
;end-of-line marker?
;yes, then abort
;quote mark?
;yes, then end of string reached
;copy character to string buffer
;increment length count
;go back for another character
;any characters in string?
;yes, then continue
;no, then abort

;point DX to filename
;open the file

;continue if open succeeded
;abort if it failed

;save file handle
;point DX to Data Transfer Area
;specify C000h bytes to be read
;get DOS file handle
;DOS function - Read Block
;read block from file on disk
;enough bytes read in to compare?
;no, then terminate
;save actual bytes read in BX
;prepare CX for comparison loop

;point DI to block just read
;save loop counter
;save start index
;prepare to compare string
;point SI to string text
;compare while equal
;restore saved registers

;match found if ZF set
;increment starting index
;loop until entire block examined
;was end-of-file reached?
;yes, then exit - string not found
;DOS function - Move File Pointer
;method code = current pos + offset
;form negative integer in DX:CX
;get string length in low word
;form complement
;form two's complement
;carry into high word (CX)
;get file handle
;move file pointer back
;read another block from disk
;test found = zero AL

;test not found = set AL to 1
;save return code in AL
;close file before exiting

;restore AL

```

(Figure 1 continues)

the system, the type of display adapter, the computer type, and whether or not an 8087 or 80287 math coprocessor chip is installed. The 8087 and 80287 keywords can be used interchangeably: either command detects the presence or absence of a math coprocessor, regardless of whether it's an 8087 or an 80287. Model returns the machine's ID byte. An IBM PC is identified by the value 255, an XT by 254, a PCjr by 253, an AT by 252, and the PC Convertible by 249. There is some uncertainty inherent in using this function because of IBM's assignment of the same internal ID code to both the XT and the now-defunct Portable PC, and because of the lack of standardization among the compatible manufacturers. In general, however, it's a pretty good way of telling what's there if the machine is a true IBM and may, with a

■ The VideoCard service assumes that either an MDA, a CGA, or an EGA is being used and returns a value from 0 to 2, correspondingly.

little experimentation, prove to be reasonably accurate in detecting the make of certain compatible units. The VideoCard service assumes that either an MDA, a CGA, or an EGA is being used and returns a value from 0 to 2, correspondingly.

## MISCELLANEOUS FUNCTIONS

Seven other functions round out CHECK's lineup. Time, Day, and Month return the current hour (0-23), day of the month (1-31), and month (1-12), respectively. VideoMode returns the current video mode (0-16), and Version reports the major number of the version of DOS being used. The major number for DOS 3.2, for example, is 3. Versions 1.00 and 1.10 cannot be reported because these earliest releases of DOS didn't incorporate service 4Ch. CHECK must be used with Version

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## ■ PC LAB NOTES

2.00 or higher. KeyBoard checks the keyboard buffer and returns a 1 if a key code is awaiting retrieval or a 0 if the buffer is empty. Finally, KeyPress returns the ASCII code of any key pressed. For those keys that produce an extended code like the function keys and the cursor keys, ERRORLEVEL will be set to 0. Together, the last two functions single handedly enhance a batch file's capability to query the user for keyboard input.

**CHECK IN ACTION** A short but useful batch file illustrates how CHECK can be used to delete a group of object files from drive B: if and only if free disk space is less than 48K. The DiskSpace function is used to report the amount of available space. [In all of the following batch files, you may wish to add ECHO OFF as the first line to suppress unwanted screen displays.—Ed.]

CHECK DISKSPACE B:  
IF NOT ERRORLEVEL 3 DEL B:\*.OBJ

Alternatively, you could construct a short file to accept a filename and to delete that file only if its length exceeded 32K.

CHECK FILESIZE %1  
IF ERRORLEVEL 33 DEL %1

A very similar batch file could make the decision whether or not to copy a given file based on its presence or absence on the target disk, though in this case you could do the same thing with the IF EXIST specification that DOS supports.

CHECK FILEFOUND B:SAMPLE.DOC  
IF ERRORLEVEL 1 COPY A:SAMPLE.DOC B:

The next few lines could be included in a batch file to load and execute a certain program (called NEWPROG here) only if the PC being used has a minimum of 256K of RAM. CHECK's Memory function makes short work of the task.

CHECK MEMORY  
IF NOT ERRORLEVEL 16 GOTO SHORT  
NEWPROG  
GOTO END  
:SHORT  
ECHO MINIMUM 256K REQUIRED TO RUN  
:END

It's not hard to envision circumstances in the near future where you would want to

```
filetext      endp

;FileSize returns the length in kilobytes of the specified file. A value of
;255 means the file is 255K or greater in length. 0 is returned if the file
;cannot be found.
filesize      proc near
    cmp parameter_count,1           ;more than 1 parameter entered?
    je eise1                         ;yes, then continue
    lee dx,errmsg2                  ;no filename - abort
    xor al,e1
    jmp eise1
eise1:        mov dx,param1_buffer   ;point DX to ASCII filename
    mov ah,50h                     ;use DOS Open File function
    xor al,e1                       ;open for reading only
    int 21h                         ;open the file
    jnc eise2                       ;continue if open succeeded
    rebot if it did not
    xor al,e1
    jmp eise1
eise2:        push ex               ;save file handle on stack
    mov bx,ex                      ;get file handle in BX
    mov eh,42h                    ;use DOS to move file pointer
    mov el,2                      ;method code = EOF + offset
    xor cx,dx                      ;specify 0 offset in DX:CX
    int 21h                       ;move file pointer to EOF
    pop bx                         ;get file handle
    push dx                       ;save EOF address
    mov ah,30h                    ;close file
    int 21h                       ;close file
    pop dx                         ;retrieve address
    mov cl,10                     ;prepare CL for shift
    ehr dx,1                      ;shift AX:DX right 10 bits
    ror cx,cl
    loop eise3
    or dx,dx                      ;DX = 0 ?
    jne max_length                ;no, filesize > 255K
    or ah,ah                      ;AH = 0 ?
    jne max_length                ;no, filesize > 255K
    jmp exit                      ;length in AL
max_length:   mov el,255          ;set AL to 255 for exit
    jmp exit
filesize      endp

;methproc returns 0 if neither 0007 nor 00207 math coprocessor is
;detected in the system or 0 if one of them is.
methproc      proc near
    finit                          ;initialize (set control word)
    fnstcw control_0007            ;write control word to memory
    cmp control_byte[1],3          ;control word correctly written?
    je found_0007                 ;yes, then 0007/00207 is there
    mov el,1                      ;no coprocessor - set AL to 1
    jmp exit
found_0007:   xor al,e1           ;zero AL
    jmp exit
methproc      endp

;PARSE_LINE parses the command line for the first two parameters entered end
;writes them into their respective storage buffers.
parse_line    proc near
    mov parameter_count,0         ;zero count of entries
    mov el,51h                   ;set SI to start of text
    call next_parameter           ;index to next parameter
    jc parse_exit                ;exit if there's not one
    mov di,keyword_buffer        ;set DI for output
    call get_parameter           ;parse parameter to buffer
    inc parameter_count          ;increment count
    call next_parameter          ;index to next parameter
    jc parse_exit                ;exit if there's not one
    mov di,param1_buffer        ;set DI for output
    call get_parameter           ;get next parameter
    inc parameter_count          ;increment count
    mov command_index,el         ;save SI for additional parsing
    ret
parse_line     endp

;NEXT_PARAMETER indexes SI to the next non-space character.
;Entry: DS:SI - current character      Exit: CF clear - character found
;      - 1 - character not found      - 1 - CF set - end-of-line reached
next_parameter proc near
    (Figure 1 continues)
```

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## ■ PC LAB NOTES

```

      cmp byte ptr [ei],31      ;end-of-line reached?
      je end_of_line           ;yes, then jump
      cmp byte ptr [ei],32      ;space character (delimiter)?
      jne no_space             ;no, then character found
      inc si                   ;advance pointer
      jmp next_parameter       ;check another character
no_space:
      cld                      ;clear CF for exit
      ret
end_of_line:
      stc                      ;set CF to indicate EOL
      jmp next_parameter_endp
;
;GET_PARAMETER transfers the command line parameter indexed by SI into the
;designated buffer area, capitalizing lowercase characters in the process and
;terminating the string with a zero for ASCII representation.
;Entry: DS:SI - parameter address
;       ES:DI - buffer address
;
get_parameter:
      proc near
      cmp byte ptr [ei],31      ;end-of-line reached?
      je end_get               ;yes, then we're done
      cmp byte ptr [ei],32      ;space character (delimiter)?
      je end_get               ;yes, then we're done
      jnb get_character         ;if it's a lowercase character?
      cmp al,97
      jb getparam1
      cmp al,122
      je getparam1
      je getparam1             ;yes, then capitalize it
      stc                      ;buffer the character
      jmp get_character         ;loop back for more
      xor al,01
      stc                      ;and string with 8 delimiter
      ret
getparam1:
      endp
;
end_get:
      ret
;
get_parameter_endp:
;
endprog:
      label byte
;
code:
      ends
      end begin

```

(Figure 1 ends)

```

188 REM -- BASIC PROGRAM TO CREATE CHECK.COM
189 OPEN "CHECK.COM" AS #1 LEN = 1
190 FIELD #1,1 AS AS
191 CHECKSUM = 0
192 FOR I = 1 TO 135
193   LINE$ = 0
194   FOR J = 1 TO 8
195     READ BYTE
196     CHECKSUM = CHECKSUM + BYTE
197   NEXT J
198   IF (BYTE < 256) THEN LET AS = CHR$(BYTE)
199   PUT #1
200   READ LINE$
201   IF LINE$ <> "" THEN PRINT "Error in Line";200 + I * 1
202 NEXT I
203 CLOSE
204 IF CHECKSUM = 113288 THEN PRINT "Successful Completion!"; END
205 PRINT "COM file is not valid!"; END
206 DATA 23, 185, 1, 32, 67, 111, 112, 121, 782
207 DATA 11, 185, 183, 184, 116, 32, 49, 57, 688
208 DATA 56, 54, 32, 98, 185, 182, 182, 45, 586
209 DATA 68, 97, 118, 185, 115, 32, 88, 117, 732
210 DATA 98, 188, 185, 115, 184, 185, 118, 183, 848
211 DATA 32, 67, 111, 46, 32, 88, 114, 111, 593
212 DATA 183, 114, 97, 189, 189, 181, 188, 32, 765
213 DATA 98, 121, 32, 74, 181, 182, 182, 32, 662
214 DATA 88, 114, 111, 115, 185, 115, 181, 75, 818
215 DATA 68, 97, 79, 32, 88, 8, 78, 73, 538
216 DATA 76, 69, 83, 73, 98, 69, 8, 86, 546
217 DATA 73, 68, 69, 79, 67, 65, 82, 68, 571
218 DATA 8, 77, 79, 68, 69, 76, 8, 56, 425
219 DATA 48, 56, 55, 8, 56, 48, 58, 56, 369
220 DATA 55, 8, 78, 73, 76, 69, 78, 79, 492
221 DATA 85, 78, 68, 8, 78, 73, 76, 69, 519
222 DATA 84, 89, 88, 84, 8, 69, 73, 83, 549
223 DATA 75, 83, 88, 65, 67, 69, 8, 86, 525
224 DATA 73, 68, 69, 79, 77, 79, 68, 69, 582
225 DATA 8, 84, 73, 77, 69, 8, 68, 65, 436
226 DATA 89, 8, 77, 79, 78, 84, 72, 8, 479
227 DATA 86, 69, 82, 83, 73, 79, 78, 8, 550
228 DATA 75, 69, 89, 66, 79, 65, 82, 68, 593

```

(continues)

abort the loading of a program file if Version 2 of DOS were being used. Here's how you could do just that:

```

CHECK VERSION
IF ERRORLEVEL 3 GOTO CONTINUE
ECHO DOS 3.00 OR HIGHER REQUIRED
GOTO END
:CONTINUE
NEWPROG
:END

```

CHECK can quickly determine what kind of video adapter is installed with its VideoCard function. This file would run one version of a program if a monochrome adapter is detected or another if either a CGA or EGA is installed:

```

CHECK VIDEOCARD
IF ERRORLEVEL 1 GOTO COLOR
PROG1
GOTO END
:COLOR
PROG2
:END

```

PROG1 is run on a monochrome system and PROG2 on a color system (assuming you can rule out the possibility of an EGA being used in conjunction with a monochrome display). You can go further with the VideoMode function and determine explicitly which video mode is currently active:

```

CHECK VIDEOCARD
IF ERRORLEVEL 16 GOTO COLOR
IF ERRORLEVEL 15 GOTO MONO
IF ERRORLEVEL 8 GOTO COLOR
IF ERRORLEVEL 7 GOTO MONO
:COLOR
ECHO THIS IS A COLOR SYSTEM!
GOTO END
:MONO
ECHO THIS IS A MONOCHROME SYSTEM!
:END

```

The logic of the above routine is based on the fact that modes 7 and 15 are the only two monochrome video modes among the 17 (numbered 0-16) supported, so it follows that if the current mode is one of those, the system is set up for a monochrome display. Any other mode indicates that it is a color system. Another hardware-related item that is sometimes useful to know is whether or not a math coprocessor is installed. If there are two versions of a program—one that takes advantage of the coprocessor (PROG1) and one that doesn't (PROG2)—an intelligent batch file like

Figure 2: This BASIC program will create CHECK.COM for you.

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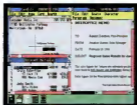
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CIRCLE 212 ON READER SERVICE CARD

## ■ PC LAB NOTES

the following can load and execute the proper program:

```
CHECK 0007
IF ERRORLEVEL 1 GOTO NOMATH
PROGL
GOTO END
:NOMATH
PROG2
:END
```

There are times when the type of computer that a program will be run on is important to the program itself. The next file checks the PC's ID byte and aborts if it's a PCjr.

```
CHECK MODEL
IF ERRORLEVEL 254 GOTO OK
IF NOT ERRORLEVEL 253 GOTO OK
ECHO DIFFERENT VERSION REQUIRED FOR PCJR
GOTO END
:OK
```

The CHECK command obviously puts a lot of power into a few program lines, but is one final point to consider about its use. Because DOS is limited to one 8-bit return code, in some cases it is impossible to pass back an indication of whether or not the function itself failed or succeeded. The FileSize command, for instance, can return a value anywhere from 0 to 255 to define the length of the file in question, but it must somehow raise a flag if the file cannot be found. In such situations, CHECK sends an error message to the display and

■ In some cases it is impossible to pass back an indication of whether or not the CHECK function itself failed or succeeded.

attempts to end with an exit code that is indicative of the worst case. Thus, FileSize returns a 0 if DOS cannot open the file for one reason or another. This philosophy is implemented consistently throughout the utility, but it once again represents the need to compromise the desirable to live within the DOS resources provided.

528 DATA	8,	75,	69,	89,	88,	82,	69,	83,	547
530 DATA	83,	8,	42,	3,	26,	3,	49,	3,	211
540 DATA	146,	3,	137,	3,	128,	3,	192,	2,	614
550 DATA	56,	3,	155,	3,	243,	2,	199,	4,	665
560 DATA	199,	4,	179,	2,	199,	2,	114,	2,	164
570 DATA	235,	2,	73,	66,	77,	8,	8,	453	
580 DATA	8,	8,	8,	56,	5,	72,	5,	138	
590 DATA	200,	5,	72,	6,	8,	13,	18,	368	
600 DATA	73,	118,	118,	97,	180,	180,	32,	743	
610 DATA	75,	101,	121,	119,	111,	114,	180,	13,	754
620 DATA	10,	36,	13,	10,	77,	185,	115,	481	
630 DATA	185,	118,	183,	32,	88,	97,	114,	97,	738
640 DATA	189,	181,	116,	181,	114,	13,	18,	688	
650 DATA	13,	10,	73,	110,	118,	97,	180,	185,	634
660 DATA	180,	32,	68,	114,	185,	118,	181,	32,	678
670 DATA	83,	112,	181,	99,	185,	182,	185,	181,	888
680 DATA	114,	13,	18,	36,	13,	18,	73,	118,	379
690 DATA	118,	97,	180,	185,	180,	32,	83,	116,	184
700 DATA	114,	185,	118,	183,	32,	83,	112,	181,	768
710 DATA	99,	185,	182,	185,	181,	114,	13,	18,	649
720 DATA	36,	13,	18,	78,	185,	188,	181,	32,	475
730 DATA	75,	111,	116,	32,	78,	111,	117,	118,	745
740 DATA	180,	13,	38,	36,	252,	232,	118,	2,	755
750 DATA	120,	62,	229,	1,	8,	117,	7,	141,	605
760 DATA	22,	18,	2,	239,	44,	141,	54,	652	
770 DATA	71,	185,	18,	8,	139,	62,	236,	718	
780 DATA	1,	172,	18,	192,	116,	13,	174,	116,	794
790 DATA	240,	73,	227,	17,	172,	18,	192,	117,	1896
800 DATA	251,	235,	234,	139,	217,	75,	289,	227,	1587
810 DATA	46,	255,	167,	194,	1,	243,	22,	1872	
820 DATA	1,	88,	180,	9,	285,	33,	68,	188,	776
830 DATA	76,	285,	33,	184,	8,	248,	142,	192,	1872
840 DATA	191,	254,	255,	38,	135,	5,	235,	239,	1355
850 DATA	180,	180,	180,	285,	235,	237,	178,	285,	1849
860 DATA	187,	8,	192,	142,	195,	191,	38,	8,	937
870 DATA	141,	54,	226,	1,	185,	3,	8,	243,	853
880 DATA	166,	116,	12,	254,	282,	188,	15,	285,	1158
890 DATA	34,	63,	1,	117,	25,	282,	138,	796	
900 DATA	194,	235,	196,	285,	18,	177,	4,	211,	1248
910 DATA	232,	235,	180,	128,	62,	229,	1,	1,	1876
920 DATA	119,	8,	141,	22,	18,	2,	176,	1,	479
930 DATA	238,	180,	192,	239,	239,	1,	61,	189,	1876
940 DATA	58,	162,	285,	33,	115,	4,	176,	1,	776
950 DATA	235,	197,	239,	216,	188,	62,	285,	33,	1227
960 DATA	58,	192,	235,	147,	188,	1,	285,	22,	1832
970 DATA	114,	46,	235,	180,	137,	58,	137,	97,	1876
980 DATA	235,	133,	188,	8,	285,	22,	233,	126,	1134
990 DATA	255,	188,	48,	285,	33,	233,	119,	255,	1328
1000 DATA	58,	218,	178,	62,	229,	1,	1,	116,	797
1010 DATA	23,	139,	54,	238,	1,	172,	44,	64,	735
1020 DATA	138,	289,	172,	68,	58,	116,	5,	141,	982
1030 DATA	22,	32,	2,	58,	192,	233,	81,	255,	867
1040 DATA	188,	54,	285,	33,	61,	255,	255,	117,	1168
1050 DATA	9,	141,	22,	32,	2,	58,	192,	233,	861
1060 DATA	63,	255,	247,	225,	247,	227,	185,	14,	1463
1070 DATA	8,	289,	234,	289,	216,	226,	258,	18,	1354
1080 DATA	228,	118,	192,	176,	255,	233,	47,	255,	1312
1090 DATA	188,	44,	285,	33,	138,	197,	233,	38,	1868
1100 DATA	255,	188,	42,	285,	33,	138,	194,	233,	1288
1110 DATA	29,	255,	188,	42,	285,	33,	138,	198,	1888
1120 DATA	233,	28,	255,	128,	62,	229,	1,	2,	938
1130 DATA	116,	9,	141,	22,	18,	176,	1,	1,	777
1140 DATA	233,	254,	254,	139,	54,	234,	1,	139,	1388
1150 DATA	62,	240,	1,	172,	68,	32,	116,	251,	934
1160 DATA	68,	39,	116,	22,	68,	13,	117,	9,	438
1170 DATA	141,	22,	18,	2,	176,	1,	233,	224,	888
1180 DATA	254,	141,	22,	68,	2,	176,	1,	233,	889
1190 DATA	215,	254,	172,	68,	13,	116,	242,	68,	1132
1200 DATA	39,	116,	7,	178,	255,	6,	238,	1,	824
1210 DATA	239,	240,	131,	62,	238,	1,	8,	185,	1816
1220 DATA	9,	141,	22,	68,	2,	176,	1,	233,	644
1230 DATA	183,	254,	139,	22,	238,	1,	188,	61,	1878
1240 DATA	58,	192,	285,	33,	115,	9,	141,	22,	1467
1250 DATA	89,	4,	192,	176,	255,	162,	181,	181,	1888
1260 DATA	232,	1,	139,	22,	242,	1,	185,	8,	822
1270 DATA	192,	139,	38,	232,	1,	188,	63,	285,	1842
1280 DATA	32,	59,	6,	238,	1,	114,	78,	139,	657
1290 DATA	216,	139,	288,	43,	18,	238,	1,	65,	888
1300 DATA	139,	62,	242,	1,	81,	87,	139,	14,	765
1310 DATA	238,	1,	139,	54,	240,	1,	243,	166,	1874
1320 DATA	95,	89,	116,	36,	71,	226,	237,	129,	999
1330 DATA	251,	8,	192,	117,	32,	181,	181,	176,	1812
1340 DATA	1,	185,	255,	259,	139,	32,	238,	1,	1888
1350 DATA	247,	218,	131,	194,	1,	131,	289,	8,	1123
1360 DATA	139,	38,	232,	1,	285,	33,	235,	178,	1885
1370 DATA	58,	192,	285,	33,	115,	9,	141,	22,	1467
1380 DATA	108,	62,	139,	38,	232,	1,	285,	33,	882
1390 DATA	88,	233,	59,	254,	128,	62,	229,	1,	1054

(Figure 2 continues)

## ■ PC LAB NOTES

1488 DATA	1,	119,	9,	141,	22,	10,	2,	58,	354
1418 DATA	192,	233,	37,	254,	139,	22,	230,	1,	1116
1420 DATA	108,	61,	58,	192,	205,	33,	115,	9,	845
1438 DATA	141,	22,	89,	7,	58,	192,	233,	16,	745
1440 DATA	254,	80,	139,	216,	108,	66,	176,	2,	1113
1450 DATA	51,	281,	51,	218,	285,	33,	91,	80,	922
1460 DATA	82,	108,	62,	205,	33,	98,	88,	177,	917
1470 DATA	18,	289,	234,	289,	216,	226,	258,	11,	1365
1480 DATA	210,	117,	7,	10,	220,	117,	3,	233,	925
1490 DATA	237,	253,	176,	255,	233,	232,	253,	219,	1058
1500 DATA	227,	217,	62,	244,	1,	128,	62,	245,	1186
1510 DATA	1,	3,	116,	5,	176,	1,	233,	214,	749
1520 DATA	253,	58,	192,	233,	289,	253,	190,	6,	1394
1530 DATA	229,	1,	8,	198,	129,	8,	232,	34,	815
1540 DATA	8,	114,	27,	139,	62,	236,	1,	232,	811
1550 DATA	6,	254,	6,	229,	1,	232,	16,	782	
1560 DATA	0,	114,	11,	139,	62,	230,	1,	232,	797
1570 DATA	26,	0,	254,	6,	229,	1,	137,	54,	787
1580 DATA	234,	1,	195,	128,	68,	13,	116,	18,	757
1590 DATA	128,	68,	32,	117,	3,	78,	235,	243,	808
1600 DATA	248,	195,	249,	195,	128,	68,	13,	116,	1284
1610 DATA	19,	128,	68,	32,	116,	14,	172,	68,	681
1620 DATA	97,	114,	6,	68,	122,	119,	2,	36,	556
1630 DATA	223,	170,	235,	232,	58,	192,	178,	195,	1467

(Figure 2 ends)

**INSIDE THE PROGRAM** CHECK's working routines can be divided into three main modules. The first parses the command line for a keyword and any required or optional parameters. The second interprets the keyword entered and transfers control to the proper location in the code based on that keyword. The third is a collection of procedures that handle the chores of each individual function that CHECK supports.

**COMMAND LINE PARSING** When CHECK is run, its first action is to call the subroutine PARSE\_LINE, which in turn calls NEXT\_PARAMETER and GET\_PARAMETER, as needed.

NEXT\_PARAMETER indexes the pointer that addresses the next character on the command line to the first character in the next parameter by skipping space characters until a non-space is encountered. This means that, like DOS, CHECK is insensitive to extraneous delimiters between parameters; but, unlike DOS, which accepts several characters as delimiters, CHECK recognizes only spaces as separators. If this description seems overcomplex, don't worry; just remember to separate command line parameters with spaces.

The first command line entry (which CHECK knows must be a keyword) is copied into the reserved area KEYWORD\_BUFFER, and a second entry, if present, is transferred into the PARAM1\_BUFFER area. Additional entries are not parsed but are still accessible. A useful feature incorporated into the pars-

ing routines is that as keywords and parameters are copied from the command line into their respective buffer areas, all alphabetic characters are capitalized and the end of each string is marked with a zero byte. There are a couple of reasons for that. Capitalization is necessary so that when the keyword entered is compared against the list of recognized keywords, the comparison will not be case sensitive. Zeros are used to mark the end of each parameter be-

■ After the parsing, CHECK examines the keyword specified on the command line to see if it matches any of those it supports.

cause DOS uses ASCII representation for its file I/O functions, and placing the zero there during parsing makes it easy to use parameters as filenames later on.

**EXAMINING THE KEYWORD** After the parsing, CHECK examines the keyword specified on the command line to see if it matches any of those it supports. This character-by-character comparison is handled in much the way high-level interpreters like BASIC typically handle it. A

pointer is set to index the first word in a list of keywords held internally by CHECK; the first character of that keyword is compared against the first character in the keyword entered on the command line. If they match, the comparison loop proceeds to the next pair of characters; if they don't, the pointer is set to the beginning of the next internal keyword and comparison is begun again. This process continues until either two matching keywords are found or the list of included keywords is exhausted. If a match is not found, an "Invalid Keyword" message is issued. If a match is detected, the count of keywords compared before a match was found is translated into a pointer into a jump table. The jump table holds the addresses of the routines that handle the individual functions. With the proper address in hand, execution is vectored to the appropriate portion of the code with an indirect jump.

## IMPLEMENTING FUNCTIONS

The third and most comprehensive module is the group of procedures that implement the functions. Each function that CHECK provides has its own handling routine. The Time, Day, and Month functions, for instance, are implemented through three very compact procedures labeled TIME, DAY, and MONTH. Each uses DOS services to find the information it needs. A handful of other functions also requires only a very small amount of code. KeyPress and KeyBoard both employ BIOS interrupt 16h to grab a key code from the keyboard buffer and to check the status of the buffer, respectively, while Version uses DOS service 30h to determine the DOS release. VideoMode likewise requires little overhead because it takes advantage of the BIOS video interrupt, interrupt 10h, to find out which mode is active. All of these are sterling examples of the programming shortcuts afforded us by the operating system and the PC's BIOS.

Other routines are slightly more complex. The DiskSpace function, for example, must allow the user to specify a target drive or, in the absence of such a specifier, must default to the current drive. The text of the drive specifier is made available by the parsing routine, which places it in the parameter buffer. The FileSize and FileFound routines must accept the entry

## ■ PC LAB NOTES

## THE ERRORLEVEL PARAMETER

DOS 2.00 introduced a whole new set of extended file functions plus input and output redirection and piping, tree-structured directories, and a number of additional features. One of its most promising but least utilized new additions was function 4Ch, a routine included in the family of interrupt 21h services. Function 4Ch allows a subprogram to terminate and return a 1-byte code to the parent program that called it via the EXEC function. Normally when we load and execute a file, the parent program is none other than COMMAND.COM, and the return code it receives is set aside in a reserved portion of memory that we can access from within a running batch process through the ERRORLEVEL parameter. You can see from the source listing of CHECK how a subprogram set: ERRORLEVEL: the value to be passed out is placed in the AL register and the program exits by executing an interrupt 21h with AH set to 4Ch.

ERRORLEVEL can be a wonderful tool. With it executable files invoked from a batch file can report their successes or failures, and a batch file can use that information to decide where to go and what to do next. The syntax of the ERRORLEVEL specification is

IF {NOT} ERRORLEVEL value command

where *value* is a numerical value against which the return code is compared, and *command* is a single instruction to be executed if the comparison proves to be true. The condition is true if the number returned by the subprogram is greater than or equal to the one specified after ERRORLEVEL. Take, for example, this short batch file often used to automate the three-step process of assembling a .COM file using IBM's Macro Assembler:

```
MASM %1;
IF ERRORLEVEL 1 GOTO END
LINK %1;
EXE2BIN %1 %1.COM
:END
```

The Macro Assembler (MASM .EXE) returns a 0 through DOS service 4Ch if the assembly was completed with no errors and a 1 if one or more errors were encountered. When the assembly phase is finished and before the LINK utility is called, the statement IF ERRORLEVEL 1 GOTO END tests the code returned by MASM. A value of 0 allows the batch process to proceed to the next instruction unimpeded, but a value of 1 or more causes the instruction GOTO END to be executed. Thus the unneeded LINK and EXE2BIN steps are skipped if MASM was unable to perform its appointed task.

You can combine the NOT parameter with IF ERRORLEVEL to execute an adjoining command if the return value is less than the value specified after ERRORLEVEL. If you wanted a batch file to automate the process of assembling and linking an .EXE file, you might create something like this:

```
MASM %1;
IF NOT ERRORLEVEL 1 LINK %1;
```

The link step will only be performed if the value of ERRORLEVEL set by MASM is NOT 1 or greater, or, in other words, if ERRORLEVEL is less than 1. By using NOT you can make the program more compact than one that uses tests combined with GOTOs, like the last batch file.

Fortunately, a numerical value assigned to ERRORLEVEL is maintained until it is explicitly replaced by a subsequent call to function 4Ch. Thus you can make successive tests of the parameter and have confidence that ERRORLEVEL will not change on your midstream. You could use the following lines in a batch file immediately after a program has set ERRORLEVEL to see which value was returned:

```
ECHO OFF
IF ERRORLEVEL 5 GOTO E5
IF ERRORLEVEL 4 GOTO E4
IF ERRORLEVEL 3 GOTO E3
```

```
IF ERRORLEVEL 2 GOTO E2
IF ERRORLEVEL 1 GOTO E1
ECHO ERRORLEVEL = 0
GOTO END
:E1
ECHO ERRORLEVEL = 1
GOTO END
:E2
ECHO ERRORLEVEL = 2
GOTO END
:E3
ECHO ERRORLEVEL = 3
GOTO END
:E4
ECHO ERRORLEVEL = 4
GOTO END
:E5
ECHO ERRORLEVEL=5 OR MORE
:END
```

Only one instruction can be included on the ERRORLEVEL line to be executed if the IF test turns out to be true. DOS makes no provisions for multiple statements (as does BASIC), nor does it provide for entire blocks of instructions to be treated as a single unit (as do Pascal and C). The IF structure is only a simple one that doesn't include an ELSE option. You're limited to what can be done with single statements and GOTOs, but that at least lets you simulate the effect of more-efficient control structures available in full-featured programming languages, albeit in a somewhat roundabout way.

In a style that has become all too familiar, Microsoft provides only marginal documentation and support for IF ERRORLEVEL. Precious few of the DOS commands return an ERRORLEVEL code, despite the fact that their doing so could increase the power of batch programs. In DOS 2.10, only BACKUP and RESTORE pass a return code. This minor but troubling omission on the part of Microsoft can only be regarded as yet another deficiency in the operating system. One can only hope that future releases of DOS will incorporate this facility, as well as a host of others longed for by power users.

—Jeff Prossie

## ■ PC LAB NOTES

## CONSTRUCTING A BATCH MENU SYSTEM

One of the things you can do with the CHECK utility is to construct a batch menu system that insulates the user from the stark DOS A> prompt and lets him choose from a number of options which program to load and execute. After an application has run, control is handed back to the menu superstructure, where the running batch file awaits further input. A simple but fully functional batch program could be invoked from the last line of your AUTOEXEC.BAT file and might look like the one shown in Figure A.

The listing in Figure A assumes, of course, that all of the applications referenced are present on the disk in the current directory. For the sake of example, I picked a few familiar applications programs like *1-2-3* and *WordStar*, but you can substitute your own list of often-used

## ■ A batch menu system insulates the user from the stark DOS prompt.

packages to tailor the menu system for your own needs.

The first thing you will probably notice when this file is run is its somewhat Spartan appearance. DOS still thinks in terms of the outdated teletype interface and not in terms of the colorful screens to which commercial software has accustomed us. Still, the menu system is handy, and it works. You could polish it up a bit with some custom routines, perhaps combined with the extended screen control functions provided by the ANSI.SYS driver, but that exercise is best left to the individual.

Notice the use of the MORE filter with the DIR command to prevent directory listings more than one screen long from scrolling into oblivion. The | character is an operator that tells DOS to pipe the output from the DIR command into

```
ECHO OFF
:START
CLS
ECHO P C M E N U S Y S T E M
ECHO .....
ECHO [1] LOTUS 1-2-3
ECHO [2] WORDSTAR
ECHO [3] TURBO PASCAL
ECHO [4] NORTON UTILITIES
ECHO [5] CHECK DISK
ECHO [6] DISK DIRECTORY
ECHO [7] EXIT TO ROOT DIRECTORY
ECHO [8] EXIT TO CURRENT DIRECTORY
ECHO .....
ECHO PRESS THE KEY THAT CORRESPONDS TO YOUR CHOICE
:LOOP
CHECK KEYPRESS
IF ERRORLEVEL 57 GOTO LOOP
IF NOT ERRORLEVEL 49 GOTO LOOP
IF ERRORLEVEL 56 GOTO LABEL8
IF ERRORLEVEL 55 GOTO LABEL7
IF ERRORLEVEL 54 GOTO LABEL6
IF ERRORLEVEL 53 GOTO LABEL5
IF ERRORLEVEL 52 GOTO LABEL4
IF ERRORLEVEL 51 GOTO LABEL3
IF ERRORLEVEL 50 GOTO LABEL2
123
GOTO START
:LABEL2
WS
GOTO START
:LABEL3
TURBO
GOTO START
:LABEL4
NU
GOTO START
:LABEL5
CHKDSK
CHECK KEYPRESS
GOTO START
:LABEL6
DIR | MORE
CHECK KEYPRESS
GOTO START
:LABEL7
CD \
:LABEL8
CLS
```

Figure A: A program-selection menu constructed using CHECK.COM.

MORE, which uses it as input. MORE is a short utility supplied with DOS that is designed specifically to aid in viewing large amounts of information one screenful at a time. Here it is followed with a call to CHECK KEYPRESS, ensuring that the final screen stays put until the user presses a key to return control to the batch program.

You'll find that the menu system runs

wonderfully from a hard disk but slowly from a floppy. It's a far cry from a true concurrent processing system that allows you to juggle several programs in memory at once and to switch back and forth between them instantly, but it's also far easier to write and maintain. It's only one example of what you can do with batch files when you make use of the CHECK utility. —Jeff Proisie

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## ■ PC LAB NOTES

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CHECK.BAS, whether typed in from the magazine at your keyboard or downloaded from PC-IRS, will automatically create CHECK.COM when run once in BASIC. CHECK.ASM, which is also listed both here and on PC-IRS, allows you to modify the program but requires you to use a suitable macro assembler (IBM or Microsoft) and the following commands:

```
MASH CHECK;
LINK CHECK;
EXE2BIN CHECK CHECK.COM
```

of a filename on the command line, and FileText has to go a step further and accept an ASCII string as well as a filename.

**FILETEXT** The FileText routine merits closer examination. FileText begins its work by setting SI to the first character (a space or carriage return) just beyond the second parameter entered on the command line. The address of that character is saved upon exit from the parsing routines in the variable COMMAND\_INDEX. Next, SI is indexed forward until it either finds an

## CHECK AT A GLANCE

The syntax for using CHECK is

```
CHECK keyword [parameter1 parameter2 ...]
```

where the 16 keywords, together with any required parameters, are listed in the box below:

Function	Return Code
FileSize <i>filespec</i>	Length of file in K
FileFound <i>filespec</i>	0 : File found 1 : File not found
FileText <i>filespec</i> 'string'	0 : String found 1 : String not found
DiskSpace [ <i>d:</i> ]	Number of whole 16K blocks free on indicated or default drive
Memory	Number of 16K RAM modules
VideoCard	0 : Monochrome Display Adapter 1 : Color Graphics Adapter 2 : Enhanced Graphics Adapter
Model	Machine ID byte
8887	0 : 8887 or 88287 installed 1 : 8887/88287 not installed
88287	0 : 8887 or 88287 installed 1 : 8887/88287 not installed
Time	Current hour (0-23)
Day	Current day (1-31)
Month	Current month (1-12)
VideoMode	Current video mode (0-16)
Version	DOS version (major number) in use
KeyBoard	0 : Keyboard buffer empty 1 : Entry awaiting processing
KeyPress	ASCII code of key pressed

ASCII 13 (the end-of-line marker) or a nonspace character, which denotes the beginning of the next string that will become the object of the search. The text string is copied into the holding buffer labeled TEXT\_STRING, and an error message is issued if a syntax error (such as a missing quote mark or a string of zero length) is encountered.

If all has gone well so far, the file specified on the command line is opened and a block of up to C000h bytes is read from it through DOS service 3Fh. Using the

8088's CMPSB instruction combined with a REPE prefix, the entire block is inspected for any occurrence of the text string. If a match is found, execution jumps to a routine that sets AL to zero and exits; if none is found, CHECK looks back to see if the entire file has been examined or if more remains to be read in. If more must be read, the file pointer is first set back a number of bytes equal to the length of the string so that an occurrence of the string that straddles the boundary between blocks will not be missed. When the entire file has been

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## ■ PC LAB NOTES

checked and the string search comes up negative, FileText exits with AL set to 1 to indicate the failure.

**FILESIZE** FileSize uses an interesting ploy to determine a file's length. All versions of DOS back to 1.00 include a service accessible through interrupt 21h that returns the size of a file in records, and by setting the record size to 1 when calling the function, we can instruct DOS to report back to us the file's length in bytes. The only problem is that, like all file I/O routines that date back to the early releases of DOS, filenames are specified through File Control Blocks (FCBs). FCBs have no provision for pathnames, a common commodity in today's numerous hard-disk-based systems. Versions of DOS from 2.00 on have no explicit file size service, but do make a provision for it with function 42h.

Function 42h, the Move File Pointer routine, must be called with AL specifying a method code. The method code is nothing more than a number from 0 to 2 that tells DOS which of three methods we want it to use to change the location of the file pointer in a file that has already been opened. If we choose a 1, the pointer is moved to the end of the file plus an offset that we supply. By setting that offset to zero, we ensure that the pointer is moved to exactly one byte beyond the end of the file.

When function 42h terminates, the AX:DX register pair is set to reflect the current position of the file pointer. And since we specified that the pointer be moved to the end, AX:DX must also reflect the number of bytes in the file. That technique allows us to find file sizes without being forced to rely on FCBs and without having to deal with disk entities on a level lower than the programming interface provided by the operating system.

**OTHER ROUTINES** The remaining routines implemented by CHECK give access to several miscellaneous system parameters. The Memory procedure invokes BIOS interrupt 12h to determine how many 16K RAM modules are present, and Model uses the machine ID byte in ROM as the basis for a return value. VideoCard checks first for the three-letter EGA signa-

ture in ROM; failing to find that, it uses the current video mode returned by interrupt 10h to decide whether a CGA or an MDA is installed. MATHPROC, the procedure invoked when either CHECK 8087 or CHECK 80287 is entered, uses a short algorithm based on one recommended by Intel to detect the presence of a math coprocessor. In a nutshell, the instruction FNINIT is issued to set the coprocessor control word to 03FFh, then the control word is written to memory where the main microprocessor can check it. If the word is correctly initialized, then CHECK knows that there must be an 8087 or 80287 in the system; if it's not, CHECK knows there can't be one.

**LOCATING BUFFERS** CHECK makes efficient use of memory for the various buffer areas it requires, the largest of which is the block of C000h bytes used as the Disk Transfer Area (DTA) when file contents are read by the FileText routine. DOS allocates all available memory to a .COM file when loading it, but a .COM file is traditionally limited to one 64K segment in which to store its code, data, and stack. The stack is located at the very top of the segment, and the code at the bottom. Since CHECK is only slightly more than 1K long, and since its stack requirements are small, there is well over 60K left unused within the segment. It's there that we locate our buffers. KEYWORD\_BUFFER, PARAM1\_BUFFER, and TEXT\_STRING are given the first 272 bytes beyond the end of the code, and the DTA is allowed to consume 48K of the rest. That leaves a generous DTA (minimizing time lost to disk accesses), plenty of room left unused for CHECK to be expanded, and decreases the length of the .COM file, since the buffer areas are not explicitly set aside within the code.

**MODIFYING CHECK** The modular design of CHECK makes it easy to modify to add functions and capabilities. You'll need the source code and an assembler to do it, however, as the alterations are beyond the scope of DEBUG.

There are four things you must do to add a function. The first and most obvious is to write a procedure to do whatever the new function is intended to do. The only

ground rule here is that you must exit with the instruction JMP EXIT with AL set to the value that will be returned to ERRORLEVEL. The only exception is when an error is encountered that calls for an abort. If that occurs, load AL with a return code, DS:DX with the address of the error message to be printed, and execute a JMP ERROR1.

The next two tasks are simple but no less important than the first. Add the text of the keyword that will invoke your new routine to the table of text labeled KEYWORDS, using all capital letters and ending the keyword with zero. A keyword may be up to 15 characters long. Next, add the DW OFFSET directive, which defines the address of the new routine in the jump table that points the way to each procedure. Its location in the jump table must correspond inversely to the position of its keyword in the keyword table; in other words, if your keyword occupies the third position in KEYWORDS, it follows that its address in the jump table must be positioned third from last.

Complete the new addition by changing the number 16 in the line MOV CX, 16 (located near the beginning of the code, just below the label CHECK1) to reflect the total number of keywords that have been defined. CHECK must know how many functions are supported in order to properly vector execution to the appropriate routine based on the keyword entered and to know when it has run out of keywords during comparison.

Almost any frequent user could come up with a wish list of new functions for CHECK. The possibilities are endless. You might even want to upgrade existing functions to increase their capabilities. One that comes to mind is a revision to the VideoCard service to sense the presence of other adapters, such as a Hercules Monochrome Graphics board or a Professional Graphics Controller. It's unfortunate that one can apply the term "programming language" only loosely to the collection of batch commands belonging to DOS, but at least with utilities like CHECK you can help batch processing live up to its potential. ☐

*Jeff Prossie is a frequent contributor to PC Magazine.*



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## ■ PROGRAMMING/UTILITIES ■ JEFF PROSISE

# PLAYING THE DATING GAME



*Here's a set of keyboard macros that let you insert long- or short-form dates and time-stamps into spreadsheets, text files, and other documents.*

Programs that create keyboard macros are among the most popular PC utilities. Macros, which let you assign one or two keystrokes to perform the function of a long keystroke sequence, save both time and a lot of frustration. To use one of these keyboard utilities even once is to fall in love with its power and simplicity.

Characteristically, however, a keyboard macro is static: once it has been defined, its meaning can be changed only by explicitly redefining it. For most applications, this limitation is not a problem. But suppose you want to create a macro that automatically inserts the date or time at the cursor position. With most keyboard enhancers you're out of luck. It might be feasible—if bothersome—to modify the date macro string every time you booted up, but to keep a time macro's definition current in terms of hours and minutes is logistically impossible.

Enter TIMEKEY, the macro utility that lets your keyboard invoke dynamic string assignments. TIMEKEY is a compact (less than 1K), memory-resident command that lets you instantly insert the current date or time into your documents at the cursor location. The date can be printed in either of two forms, and whether you're working with a spreadsheet, word processor, or nearly anything else, adding time- and date-stamps is as effortless as pressing the Alt key in conjunction with one other.

**USING TIMEKEY** You install TIMEKEY by loading it into memory once, at the beginning of a session. It's im-

portant to install TIMEKEY *after* the system date has been set. If you use a floppy-disk-based system, the DOS DATE and TIME commands automatically come up first when you boot, and an AT will handle them before processing your AUTOEXEC.BAT. If you want to put TIMEKEY in the AUTOEXEC.BAT file of an XT, just make sure that the software for any clock/calendar device you use runs before TIMEKEY is loaded. TIMEKEY does not update the system date after installation, so if you leave your PC on overnight you'll have to reset it and reinitialize TIMEKEY to keep its date accurate. On the other hand, because it queries the BIOS for the current time whenever its time macro is invoked, TIMEKEY will automatically adjust to the changes of the computer's internal time-of-day count even after installation.

TIMEKEY uses three predefined keyboard macros. Pressing Alt-T (for Time)

prints the current time in the form: 12:21 p.m. Alt-L (for Long Date) outputs the date in the "long" form: January 1, 1987. Alt-S (for Short Date) inserts the date in the abbreviated form: 1-1-87. As with any key definition utility, you determine where the string will be written on the screen by placing the cursor at the location where the text is to begin. Pressing the desired Alt-key combination then inserts the time or date just as if you manually typed each individual character.

**COMPATIBILITY LIMITATIONS** TIMEKEY is generally compatible with other software, but, as with any terminate-but-stay-resident program, it may conflict with a handful of other resident utilities like itself and with programs that intercept the keyboard interrupt. If it doesn't seem to work with other resident programs you normally use, try changing the order in which they are loaded. It worked successfully in parallel with everything I tried it with, including *SideKick*. TIMEKEY uses both the timer and the keyboard interrupt, but it is written in such a way that the timer interrupt is merely borrowed, not stolen, from other coresident programs that might need it too. (BASIC, for one, employs the timer interrupt.) TIMEKEY does, of course, claim the three Alt-key combinations it employs for itself. Underlying applications programs will never know that Alt-T, Alt-L, or Alt-S was pressed. If these key assignments conflict with your other software, a way to change them is provided. All other Alt-key combinations should work as they normally do.

■ TIMEKEY is written in such a way that the timer interrupt is merely borrowed, not stolen, from other coresident programs.

## ■ PROGRAMMING/UTILITIES

**GETTING TIMEKEY** As explained in the sidebar "Downloading TIMEKEY," the program may be downloaded by modem in any or all of its three forms (.COM, .ASM, and .BAS) from the PC Magazine Interactive Reader Service. TIMEKEY.ASM, the assembler source code, is shown in Figure 1. TIMEKEY.BAS, shown in Figure 2, automatically creates TIMEKEY.COM when you run it once.

**INSIDE TIMEKEY** All the keyboard macro programs I know work on a common but powerful principle: a memory-resident routine sits quietly in memory monitoring the keyboard for keystrokes that have been assigned to macro strings. When one of these keystrokes is detected, the assigned string is output by transferring its content, one character at a time, directly into the keyboard buffer. As far as the application that requested the keystrokes knows, the characters are being typed in at the console. TIMEKEY works the same way. The only significant difference between our program and others is that TIMEKEY doesn't require that strings be defined by the user, and, in the case of the time macro, the string definition is made on the fly.

When invoked from the command line (or through your AUTOEXEC.BAT file), TIMEKEY executes an initialization sequence that sets the gears in motion for the resident portion of the program to go to work. First, the date is obtained from DOS, via interrupt 21h function 42. The value returned is converted into two strings, one for the long form of the date and one for the short. Both are stored in the code that will remain behind in memory after the order to terminate-but-stay-resident has been issued.

The date strings are set at startup time for two reasons. First, it saves time when Alt-L or Alt-S is pressed, since the strings don't have to be reformed each time. Second, DOS services, unlike their BIOS counterparts, are nonreentrant. This means that DOS functions normally accessed through interrupt 21h cannot be directly called from within a running interrupt handler. That's why the date is obtained from DOS during installation, outside the confines of the interrupt routine.

TIMEKEY.COM for the IBM Personal Computer - 1986 by Jeff Proise

```

kb_date      equ 50h           ;keyboard date port
kb_ctrl      equ 51h           ;keyboard control port
l_key        equ 30            ;scan code for 'L' key
s_key        equ 31            ;scan code for 'S' key
t_key        equ 28            ;scan code for 'T' key
alt_key      equ 8             ;shift code for Alt key
eol          equ 20h           ;EOL value
int_ctrl_port equ 20h         ;8255 port address
;
bios_date     segment at 40h    ;BIOS date area
org 100h
buffer_head   dw ?             ;head of keyboard buffer
buffer_tail   dw ?             ;tail of keyboard buffer
buffer_start  dw ?             ;starting keyboard buffer address
buffer_end    dw ?             ;ending keyboard buffer address
bios_data     ends
;
code          segment para public 'code'
assume cs:code
org 100h
jmp init
;
copyright     db "TIMEKEY (C) 1986, Siff-Davis Publishing Co.",1ah
author        db "programmed by Jeff Proise",1ah
long_data     db 19 dup (?)     ;long data string buffer
short_data    db 9 dup (?)      ;short data string buffer
time_buffer   db 11 dup (?)     ;time string buffer
current_hour   db ?             ;current hour count
current_min    db ?             ;current minutes count
status        db ?             ;status of output routine
intx          db 2 dup (?)      ;AND/OR designator
old_int_9      label dword      ;old interrupt 9 vector
old_int_1ch    label dword      ;old interrupt 1ch vector
old_timer_int  dw 2 dup (?)
;
;-----
;this routine will be executed at every tick of the time-of-day clock.
;-----
timer_int     proc near
pushf         ;push flags to simulate INT
call old_int_1ch
cmp buffer_flag,0
je timer_exit
push ax
push bx
push dx
push si
cell fill_buffer
;output to keyboard buffer
;restore register values
pop si
pop dx
pop bx
pop ax
timer_exit:   iret              ;exit and enable interrupts
timer_int     endp
;
;-----
;Execution will come here every time a key is pressed or released.
;-----
kb_int        proc near
eti           ;enable interrupts
push ax
mov ax,2
int 16h
test el,alt_key
je kb_exit
in el,kb_data
cmp el,t_key
je kbint1
cmp el,l_key
je kbint1
cmp el,s_key
je kbint1
kb_exit:      pop ax
jmp old_int_9
;
;One of the trigger key combinations was pressed. Save register values and

```

(continues)

Figure 1: The assembly language program for TIMEKEY.COM.

```

;reset the keyboard.
;
kaint1:  push bx          ;save remaining registers
         push dx
         push si
         push di
         push ds
         push es
         push ax          ;save scan code
         in al,kb_ctrl    ;get keyboard control byte
         mov ah,al        ;save it in AH
         or al,$0b        ;set high bit
         out kb_ctrl,al    ;send it to control port
         mov al,ah        ;get original byte value
         out kb_ctrl,al    ;OUT it to enable keyboard
         pop ax           ;restores scan code
         push cs          ;set DS and ES to code segment
         pop ds
         push cs
         pop ds
         assume ds:code
         cmp al,t_key
         je kaint2
;
;Alt-L or Alt-S was pressed. Set BUFFER_PTR to proper date string.
;
         mov buffer_ptr,offset long_date    ;set pointer for long date
         cmp al,l_key                      ;was Alt-L pressed?
         je kaint6                         ;yes, then skip ahead
         mov buffer_ptr,offset short_date   ;set pointer for short date
         jmp kaint6                       ;goto output routine
;
;Alt-T was pressed. Convert time to ASCII form and set BUFFER_PTR.
;
kaint2:  mov ah,0
         int 1ah
         mov es,cs
         mov bl,24
         div bl
         mov hour,ah
         mov es,es
         mul dx
         mov minutes,di
         cld
         lea di,time_buffer
         mov al,hour
         cmp al,9
         jne kaint3
         add al,12
         cmp al,12
         jbe kaint4
         sub al,12
         mov bl,30h
         call bin2asc
         mov al,' '
         stc
         mov al,minutes
         mov bl,0
         call bin2asc
         mov time_test[1],'P'
         cmp hour,11
         je kaint5
         mov time_test[1],'A'
         lea al,time_test
         mov cs,6
         rsp movsb
         mov buffer_ptr,offset time_buffer ;set pointer for output
;
;Output buffer is indexed by variable BUFFER_PTR. Insert as much as possible
;of the indicated string into the keyboard buffer, then exit.
;
kaint6:  call fill_buffer    ;output until done or buffer full
         cld
         mov al,eoi
         out int_ctrl_port,al
         ;disable interrupts
         ;end interrupt
         ;restores saved register values
         pop es
         pop ds
         pop di
         pop si
         pop dx
         pop cs
         pop bx
         pop ax

```

(Figure 1 continues)

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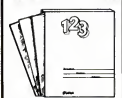


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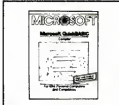
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## ■ PROGRAMMING/UTILITIES

BIOS routines, by contrast, can be invoked from an interrupt handler, so the services encoded in the PC's ROM to determine the time are always available.

To complete the initialization phase, DOS services are used again to save and reset the interrupt vectors that address the handling routines for interrupts 9 and 1Ch, the keyboard and timer interrupts, respectively. The original vectors are saved so that, when appropriate, control can be passed from our own handling routines to the BIOS routines. The vectors are reset to activate our own handlers. Finally, an interrupt 27h is executed to exit from TIMEKEY and leave the heart of the code behind to monitor keyboard activity, and to insert time and date strings when such services are requested.

When a key or key combination other than those assigned to the time and date macros is pressed, control is passed right back to the BIOS keyboard handler so that normal functions are unimpeded. When a trigger key combination is detected, TIMEKEY springs into action.

After installation, if Alt-L or Alt-S is pressed, a variable called BUFFER\_PTR is set to address the first character in the long or short date string. If Alt-T is entered, there's more work to be done. BIOS interrupt 1Ah is called upon to obtain the current clock count. The PC maintains the time of day through the services of channel 0 of the 8253 timer chip, which ticks away at a frequency of 1,193,182 cycles per second. Every 65,536 beats, or approximately 18.2 times per second, a two-word clock count value stored in the BIOS data area is incremented by one, and from this we can determine what time it is by reading the count and converting it into hours, minutes, and seconds.

A 32-bit unsigned integer like the clock count can represent a number anywhere from 0 to 4,294,967,296. There are several ways to turn this number into a humanly meaningful form, but whatever way is chosen, it must act quickly, for it's working inside an interrupt service routine where time is precious. Here's the way I decided on:

Simple arithmetic tells us that the clock count is incremented 65,543 times in the course of an hour. This value is very close to 65,536, which is the number of different

```

kb_int      irat      jexit
endp

;BIN2ASC converts a binary value less than 100 into its text equivalent.
;Entry: ES:DI = buffer address
;       AL = byte value
;       BL = 0 = print leading zeroes, 30h = suppress leading zeroes
bin2asc     proc near
    mov     edi,0          ;convert AL to BCD value in AX
    add     edi,3070h      ;binary to ASCII
    cmp     ah,bl          ;suppress leading zeroes?
    je      bin1           ;yes, then jump
    mov     edi,edi         ;get first digit in AL
    aasb          ;print first digit
    mov     edi,edi         ;restore original value of AL
    aasb          ;print second digit
bin1:
    mov     edi,0
    andp
;-----
;FILL_BUFFER outputs a string of bytes delimited by a zero byte directly to
;the keyboard buffer.
;Entry: BUFFER_PTR = offset address of next byte to transmit
fill_buffer proc near
    push    ds             ;save DS
    mov     dx,bios_date   ;then set it to BIOS date segment
    mov     ds,ex
    assume ds:bios_date
    mov     bx,buffer_tail ;get location of buffer tail
    mov     si,buffer_ptr   ;get value of buffer index
    mov     ah,ah          ;zero AH
    mov     al,[si]         ;get next character to output
    je      zero           ;is it zero?
    mov     dx,bx          ;yes, then we're done
    add     dx,2            ;get buffer tail into DX
    cmp     dx,buffer_end   ;increment to next location
    jne     fillbuf2       ;do we need to wrap around?
    mov     dx,buffer_start ;no, so jump
    jmp     fillbuf1        ;wrap around to start address
fillbuf2:
    cmp     dx,buffer_head  ;head = tail?
    je      fillbuf1       ;yes, then buffer is full
    mov     bx,ax          ;deposit character into buffer
    mov     bx,ds           ;advance keyboard buffer pointer
    mov     bx,ds           ;update BIOS record of buffer tail
    mov     bx,ds           ;advance index
    mov     bx,ds           ;advance output buffer pointer
    jmp     fillbuf1        ;loop back for more
buffer_full:
    mov     buffer_flag,1   ;set flag to indicate not done
    jmp     done1
done:
    donal:
    mov     buffer_flag,0   ;all done - set flag
    pop     ds             ;restore DS
    ret
fill_buffer endp
;-----
;INITIALIZE routine places the string equivalents of the current date (long
;form and short form) into their respective storage areas and sets interrupt
;vectors to enable the resident portion of the code.
initialize proc near
    month_text db 7,'January ' ,text of month names
               db 8,'February '
               db 5,'March '
               db 3,'April '
               db 3,'May '
               db 4,'June '
               db 4,'July '
               db 6,'August '
               db 9,'September'
               db 7,'October '
               db 8,'November '
               db 8,'December '

    month      db 7
    day        db 7
    year       db 7
    text1      db ' , 19'

    month number (1-12)
    day number (1-31)
    year number (8-99)
    partial text of long date string

```

(Figure 1 continues)

```

;Get the current month, day, and year from DOS and save the values.
;
init1:    mov ah,42                      ;get system date from DOS
          int 21h
          sub cx,1990                   ;subtract 1990 from year
          mov month,dh                  ;save month, day, and year
          mov day,d1
          mov year,c1
          cid                            ;clear DF for string operations
;
;Create the long data string in the LONG_DATE buffer.
;
          dec dh                        ;find table offset of month text
          mov al,10                      ;set multiplier
          mul dh                         ;(month-1) * 10
          mov si,ax                      ;transfer table offset to SI
          add si,offset month_text       ;complete offset address
          mov cl,[si]                   ;get length of month name
          inc si                          ;point SI to text of string
          xor ch,cb                      ;byte to word in CX
          laa di,long_date              ;point DI to LONG_DATE area
          rep movsb                      ;transfer name of month to buffer
          mov al,32                      ;add space character after month
          stosb
          mov al,d1                     ;get day in AL
          mov bl,30h                    ;suppress xaroes
          call bin2asc                   ;add day to the buffer
          laa si,txt1                    ;add ' ', 19' text
          mov cx,4                      ;four characters to transfer
          rep movsb
          mov al,year                   ;get year in AL
          mov bl,0                      ;print xaroes
          call bin2asc                   ;add it to the buffer
          mov al,0                      ;terminate string with ASCII xaro
          stosb
;
;Create the short data string in the SHORT_DATE buffer.
;
          laa di,short_data             ;point DI to short date buffer
          mov al,month                  ;get month in AL
          mov bl,30h                    ;suppress xaroes
          call bin2asc                   ;write it to the buffer
          mov al,'-'                    ;add dash separator
          stosb
          mov al,day                    ;get day of month in AL
          mov bl,30h                    ;suppress xaroes
          call bin2asc                   ;write it to the buffer
          mov al,'-'                    ;add dash separator
          stosb
          mov al,year                   ;get year in AL
          mov bl,0                      ;print xaroes
          call bin2asc                   ;write it to the buffer
          mov al,0                      ;terminate string with ASCII zero
          stosb
;
;Save and set the interrupt 9 and 1Ch vectors to enable our new routines.
;
          mov ah,35h                    ;get interrupt 1Ch vector
          mov al,1Ch
          int 21h
          mov old_timer_int,bx          ;save it
          mov old_timer_int[2],ax
          mov ah,25h                    ;set interrupt 1Ch vector
          mov al,1Ch
          int 21h                       ;point it to our timer routine
          mov ah,35h                    ;get old interrupt 9 vector
          mov al,9
          int 21h                       ;save it
          mov old_keyboard_int,bx
          mov old_keyboard_int[2],ax
          mov ah,25h                    ;set interrupt 9 vector
          mov al,9
          int 21h                       ;point to our keyboard handler
          laa dx,kb_int
          int 21h                       ;point DX to end of resident code
          laa dx,initialize              ;terminate-but-etay-resident
          int 21h
initialize: endp
;
code:
          ends
          and begin

```

(Figure 1 ends)

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## ■ PROGRAMMING/UTILITIES

■ The keyboard buffer is an area of memory, 16 words in length, set aside in the BIOS data area to receive and hold each keystroke until a program requests it.

values that can be represented by a 16-bit binary value. Since the count consists of two words, you won't be far off by assuming that the high word is incremented exactly once each hour, since in that time the low word must fill up and spill over into the high one. Therefore you can determine the hour of day simply by taking the value of the high word of the clock count, returned in the CX register by interrupt 1Ah.

One additional thing must be done with the count of hours passed. If you were to leave the PC on without resetting it for a number of days after setting the time, the clock count would keep track of all hours that had accumulated; it doesn't reset after each 24-hour period. If you simply divide the sum total of the hours by 24, however, the remainder from the division represents the number of hours into the current day. This covers all the bases, so to speak, and makes sure that the utility doesn't output funny values under obscure but foreseeable circumstances.

To find the minutes, you observe that, assuming the clock is incremented 65,536 times per hour, the low word of the clock count divided by 65,536 must represent the fraction of an hour that has passed. If you divide the low word by 65,536 and multiply by 60 to convert to minutes, you know how many minutes have passed. There's a shortcut we can use to our advantage here. If we place the low word in DX, 60 in AX, and execute the instruction MUL DX, we're left with the result of the multiplication in the AX:DX register pair. Now we need to divide by 65,536. We can

```
100 REM --- BASIC PROGRAM TO CREATE TIMEKEY.COM
110 OPEN "TIMEKEY.COM" AS #1 LEN = 1
120 FIELD #1,1 AS A$
1300 CHECKSUM = 0
140 FOR I = 1 TO 92
150   LINESUM = 0
160   FOR J = 1 TO 8
170     READ BYTE
180     CHECKSUM = CHECKSUM + BYTE
190     LINESUM = LINESUM + BYTE
200     IF (BYTE < 256) THEN LSET A$ = CHR$(BYTE)
210     PUT #1
220   NEXT J
230   READ LINECHECK
240   IF LINECHECK <> LINESUM THEN PRINT "Error in Line";200 + 10 * I
250 NEXT I
260 CLOSE
270 IF CHECKSUM = 61993 THEN PRINT "Successful Completion!"; END
280 PRINT "COM file is not valid!"; END
290 DATA 233, 58, 2, 84, 73, 77, 69, 75, 663
300 DATA 65, 89, 32, 48, 67, 41, 32, 49, 419
310 DATA 57, 56, 54, 44, 32, 98, 185, 182, 548
320 DATA 182, 45, 68, 97, 118, 185, 115, 32, 682
330 DATA 88, 117, 98, 188, 185, 115, 184, 185, 832
340 DATA 118, 183, 32, 67, 117, 46, 26, 112, 687
350 DATA 114, 111, 183, 114, 87, 189, 189, 181, 858
360 DATA 188, 32, 98, 123, 32, 74, 181, 182, 669
370 DATA 182, 32, 88, 114, 111, 115, 185, 115, 774
380 DATA 181, 26, 8, 8, 8, 8, 8, 8, 127
390 DATA 8, 8, 8, 8, 8, 8, 8, 8, 8
400 DATA 8, 8, 8, 8, 8, 8, 8, 8, 8
410 DATA 8, 8, 8, 8, 8, 8, 8, 8, 8
420 DATA 8, 8, 8, 8, 8, 8, 8, 8, 8
430 DATA 8, 8, 8, 8, 8, 8, 32, 88, 128
440 DATA 46, 77, 46, 8, 8, 8, 8, 8, 169
450 DATA 8, 8, 8, 8, 156, 46, 255, 38, 487
460 DATA 128, 1, 46, 128, 62, 115, 1, 8, 481
470 DATA 116, 11, 88, 83, 82, 86, 232, 287, 897
480 DATA 8, 94, 58, 51, 86, 287, 251, 88, 981
490 DATA 118, 8, 285, 22, 168, 8, 116, 14, 715
500 DATA 228, 96, 68, 28, 116, 14, 68, 38, 632
510 DATA 116, 18, 68, 31, 116, 8, 88, 46, 473
520 DATA 255, 46, 124, 1, 83, 83, 82, 86, 758
530 DATA 87, 38, 6, 88, 228, 87, 128, 224, 898
540 DATA 12, 128, 238, 97, 138, 156, 238, 97, 1128
550 DATA 88, 14, 7, 34, 31, 68, 28, 116, 358
560 DATA 15, 199, 6, 116, 1, 74, 1, 68, 476
570 DATA 38, 116, 188, 195, 6, 116, 1, 93, 669
580 DATA 1, 235, 92, 144, 188, 8, 285, 26, 883
590 DATA 139, 193, 179, 24, 246, 243, 136, 38, 1198
600 DATA 113, 1, 184, 68, 8, 247, 226, 136, 967
610 DATA 22, 114, 1, 252, 141, 62, 182, 1, 495
620 DATA 168, 113, 1, 68, 8, 117, 2, 4, 457
630 DATA 12, 68, 12, 118, 2, 44, 12, 179, 439
640 DATA 48, 232, 68, 8, 178, 58, 178, 168, 984
650 DATA 114, 1, 179, 8, 232, 49, 8, 198, 773
```

(continues)

Figure 2: A BASIC program to create TIMEKEY.COM.

effectively divide a double-word value by 65,536 by shifting 16 bits to the right, or by simply dropping the low-order word and replacing it with the high-order word. In our case, this means that after the multiplication, the number of minutes is held in the DL register. The end result is that we can convert a clock count into hours and minutes with a minimum of math and without sacrificing accuracy.

Finally, we reach the part of TIMEKEY that actually inserts the strings into the keyboard buffer. The buffer is an area of memory, 16 words in length, set aside in the BIOS data area to receive each keystroke entered and to hold it until a pro-

gram requests it. The request is usually made through interrupt 16h. The BIOS keeps track of two parameters related to the buffer: the head and the tail. The head is the address in memory (and in the buffer) where the next character will be read from. The tail is where the next one entered will be written to. Up to 16 entries can be buffered in this circular queue, and the order of their entry is maintained as the head continually chases the tail but is never allowed to overtake it. The buffer is empty when the address of the head is the same as the address of the tail. Likewise, we can tell when it's full because the tail will be lagging behind the head by only one word,

## ■ PROGRAMMING/UTILITIES

660 DATA	6,	119,	3,	80,	120,	62,	113,	1,	510
670 DATA	11,	119,	5,	190,	6,	119,	1,	65,	524
680 DATA	141,	54,	110,	1,	185,	6,	8,	243,	740
690 DATA	164,	190,	6,	116,	1,	102,	1,	232,	822
700 DATA	30,	0,	250,	176,	32,	230,	32,	7,	757
710 DATA	31,	95,	94,	90,	85,	91,	80,	207,	785
720 DATA	212,	10,	5,	40,	18,	59,	227,	116,	724
730 DATA	5,	134,	224,	170,	130,	224,	170,	155,	1256
740 DATA	30,	104,	64,	0,	142,	216,	135,	30,	895
750 DATA	20,	0,	46,	139,	54,	116,	1,	50,	434
760 DATA	228,	46,	130,	4,	10,	192,	116,	46,	780
770 DATA	139,	211,	131,	194,	2,	59,	22,	139,	800
780 DATA	0,	117,	6,	139,	22,	128,	0,	59,	469
790 DATA	22,	26,	0,	116,	16,	137,	7,	139,	463
800 DATA	218,	137,	30,	20,	0,	70,	46,	255,	704
810 DATA	6,	116,	1,	235,	212,	46,	190,	6,	828
820 DATA	115,	1,	1,	235,	7,	144,	46,	190,	747
830 DATA	6,	115,	1,	0,	31,	195,	7,	74,	429
840 DATA	97,	110,	117,	97,	114,	121,	32,	32,	720
850 DATA	0,	70,	101,	90,	114,	117,	97,	114,	719
860 DATA	121,	32,	5,	77,	97,	114,	99,	104,	640
870 DATA	32,	32,	32,	32,	5,	65,	112,	114,	424
880 DATA	105,	108,	32,	32,	32,	32,	3,	77,	421
890 DATA	97,	121,	32,	32,	32,	32,	32,	32,	410
900 DATA	4,	74,	117,	110,	101,	32,	32,	32,	502
910 DATA	32,	32,	4,	74,	117,	100,	121,	32,	520
920 DATA	32,	32,	32,	32,	6,	65,	117,	103,	419
930 DATA	117,	115,	116,	32,	32,	32,	9,	83,	536
940 DATA	101,	112,	116,	101,	109,	90,	101,	114,	852
950 DATA	7,	79,	95,	116,	111,	90,	101,	114,	725
960 DATA	32,	32,	0,	70,	111,	118,	101,	109,	509
970 DATA	90,	101,	114,	32,	8,	60,	101,	99,	621
980 DATA	101,	109,	90,	101,	114,	32,	0,	0,	555
990 DATA	0,	4,	32,	40,	37,	100,	42,	205,	600
1000 DATA	33,	129,	233,	100,	7,	136,	54,	46,	746
1010 DATA	3,	136,	22,	47,	3,	136,	14,	40,	409
1020 DATA	3,	252,	254,	286,	176,	18,	246,	238,	1377
1030 DATA	130,	240,	129,	190,	162,	130,	130,	12,	1040
1040 DATA	70,	50,	237,	141,	62,	74,	1,	243,	870
1050 DATA	164,	176,	32,	170,	138,	194,	179,	40,	1101
1060 DATA	232,	237,	254,	141,	54,	49,	3,	179,	1155
1070 DATA	47,	0,	243,	164,	46,	3,	179,	101,	804
1080 DATA	0,	232,	228,	254,	176,	0,	170,	141,	1193
1090 DATA	62,	93,	1,	160,	46,	3,	179,	40,	592
1100 DATA	232,	205,	254,	176,	45,	170,	160,	47,	1209
1110 DATA	3,	179,	40,	232,	194,	254,	176,	45,	1131
1120 DATA	179,	160,	40,	179,	0,	232,	183,	75,	1040
1130 DATA	254,	176,	0,	170,	100,	53,	176,	20,	1037
1140 DATA	205,	33,	137,	30,	120,	1,	140,	6,	600
1150 DATA	130,	1,	100,	37,	176,	20,	141,	22,	715
1160 DATA	132,	1,	205,	33,	100,	53,	176,	9,	700
1170 DATA	205,	33,	137,	30,	124,	1,	140,	6,	676
1180 DATA	126,	1,	100,	37,	176,	9,	141,	22,	692
1190 DATA	150,	1,	205,	33,	141,	22,	102,	2,	744
1200 DATA	205,	39,	0,	0,	0,	0,	0,	0,	244

(Figure 2 ends)

leaving no room for additional entries. When the BIOS detects this latter condition after we type a key, it begins to warn us that the buffer is full and discards the extraneous character.

To insert characters into the keyboard buffer, TIMEKEY calls the subroutine FILL\_BUFFER with the pointer BUFFER\_PTR set to the offset address of the first character in the string to be output. FILL\_BUFFER places each character, one at a time, into the buffer until it encounters a zero (marking the end of the string), or, more importantly, until the buffer fills to capacity. The buffer can hold only 16 keystrokes, but some of our date strings (September 30, 1986, for example) are longer than 16 characters. Interrupts

are disabled while we fill the buffer (a necessity so that an unruly interrupt cannot break in and try to access the buffer while we are tampering with it) because we haven't sent an end-of-interrupt signal to the 8259 Interrupt Controller. But with interrupts disabled, nothing can be read from the buffer. Characters must be read to make room for more. If the buffer is filled to capacity before the string is depleted, we must somehow mark our place in the string, exit to give the parent program a chance to extract one or more characters, then return to finish the job.

The timer interrupt provides the perfect solution. Every time the clock count is updated, the BIOS also calls interrupt 1Ch. The 1Ch vector normally points to an

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## ■ PROGRAMMING/UTILITIES

IRET instruction, representing a null interrupt handler. If we set the ICh vector to point to our own routine, as TIMEKEY does during initialization, then our routine is invoked 18.2 times every second.

If the `FILL_BUFFER` routine can place all of the time or date string into the keyboard buffer, then its job is done and it ends the interrupt sequence by signaling the 8259, restoring the saved register val-

ues, and exiting. But if it can't finish because buffer space runs out first, it sets a flag called `BUFFER_FLAG` to 1 before closing out. When the timer routine `TIMER_INT` is vectored to at the next clock tick, it sees the nonzero flag and knows there is unfinished work to be done. It also knows where in the string to resume output, since `BUFFER_PTR` indexes the next character to be output. The timer routine calls `FILL_BUFFER` to try again to insert characters, setting `BUFFER_FLAG` to zero on exit if output is completed, and setting it to 1 if it's not. Characters can be read from the buffer in the time that elapses between timer interrupts, so eventually (and in a short period of time) the entire string is written to the keyboard buffer and thus to the running application program.

The timer routine carries out a vital task every time it executes even before `BUFFER_FLAG` is checked. It calls as a subroutine the original routine pointed to by the interrupt ICh vector at initialization time, just in case another resident utility is also using the timer interrupt. In a spirit of cooperation, system facilities are shared with other tenants to achieve as high a degree of compatibility between independent utilities as possible.

One nonstandard element of the `FILL_BUFFER` routine is worth closer inspection. A keypress is represented in the keyboard buffer as a 2-byte word in either of two ways. Keys that return extended codes (e.g., the function keys, cursor pad keys, and keys shifted by the Alt key) are recorded with a zero in the low byte of the word and the scan code in the high byte. Those keys that have corresponding ASCII codes, however, place the ASCII code in the low byte and the scan code in the high. In the latter case, the scan code is rarely used; instead, we rely on the ASCII code to tell us which key was activated. `FILL_BUFFER` cheats when it inserts a character into the buffer. It places the ASCII code in the low byte but makes the high byte zero, eliminating the need for additional code to calculate a corresponding scan code. In theory, this could confuse a program that relied on the scan codes returned from the keyboard buffer when trapping keys, but in practice I have yet to encounter one that actually makes use of them for nonextended codes.

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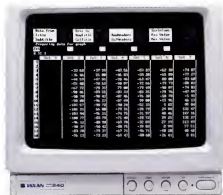


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## ■ PROGRAMMING/UTILITIES

# DOWNLOADING TIMEKEY

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The modem number for PC-IRS is (212) 696-0360. Set your modem and communications software to use 1,200 (or 300) bps, 8 data bits, 1 stop bit, no parity. PC-IRS files with a .COM,

.EXE, or .ARC extension require that you also use the Xmodem error-checking protocol; our other files (e.g., with extensions of .ASM or .BAS) can be downloaded using either regular ASCII or Xmodem transmission.

TIMEKEY.BAS, whether typed in from the magazine at your keyboard or downloaded from PC-IRS, will automatically create TIMEKEY.COM when run once in BASIC. TIMEKEY.ASM, also listed both here and on PC-IRS, allows you to modify the program but requires you to use a macro assembler (IBM or Microsoft) and the following commands:

**NASM TIMEKEY;  
LINK TIMEKEY;  
EXE2BIN TIMEKEY TIMEKEY.COM**

## TIMEKEY AT A GLANCE

Syntax:

[d:][path]TIMEKEY

### Operation:

TIMEKEY is a memory-resident utility that inserts the data and/or time into documents being prepared by other applications. TIMEKEY must be loaded after the system date and time have been initialized. Subject to this limitation, it may be loaded either at the command line or as part of an AUTOEXEC.BAT file.

Once loaded, TIMEKEY uses the following keystrokes:

Alt-L inserts the long-form date (e.g., June 10, 1987)

Alt-S inserts the short-form date (e.g., 6-10-87)

Alt-T inserts the time (e.g., 12:21 PM).

TIMEKEY is compatible with BASICA (which also uses the timer interrupt) and with many memory-resident utilities (e.g., SideKick), but compatibility with all TSR programs cannot be assured.

## CHANGING THE TRIGGER KEYS

If you want to use TIMEKEY in conjunction with an application that employs the Alt key but don't want to forfeit the use of Alt-T, Alt-L, and Alt-S, it's easy to change the code with DEBUG so that the Ctrl key is used instead of Alt. Simply change the byte at offset 01A5h from 8 to 4, and the time and date macros will be assigned to Ctrl-T, Ctrl-L, and Ctrl-S. Be warned, however, that this creates a potential conflict with programs like WordStar that use Ctrl combinations. Think ahead, but don't be afraid to try it if the need arises. Sometimes there's no substitute for experimentation.

You can use the routines and principles

embodied in TIMEKEY as building blocks to construct a fully featured keyboard macro utility like SuperKey or ProKey to enhance the power of your console. For further details on how the keyboard buffer is manipulated and how the timer interrupt interacts with the rest of the system, refer to the listing of the ROM BIOS published in the PC Technical Reference, which should be on every programmer's desk. It's an invaluable guide to system programming, and is often the best source for unraveling the secrets of the inner workings of the PC.

Jeff Prossie is a frequent contributor to the Programming/Utilities column.

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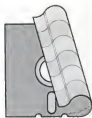
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■ JARED TAYLOR

# SPREADSHEET CLINIC



*New techniques for calculating print range width in 1-2-3; using spreadsheets for printing banners; deleting columns; and hiding macro scripts.*

## FINDING PRINT RANGE WIDTH

Figure 1 shows two ways of determining how wide your print range will be in 1-2-3. Release 2.0. To use the first, simply put the formula

*(@repeat ("a", x))*

just above the print range. The value of *x* should be the number of characters in a line, i.e., the right margin minus the left margin. The letter "a" will now be repeated just above the print range, one "a" for every character of your line length. If the print range extends past the last "a," it's too wide.

A different way to figure the width of your range is to use the pair of formulas also shown in Figure 1, putting them in cells one above the other. In this case, *y* should be your line length divided by ten. If you are using 1-2-3 as a word processor, you can fix titles horizontally just below the *(@repeat* formula(s) and you can tell at a glance how close you are to the right margin.

Scott Olson  
White Bear Lake, Minnesota

*In past issues of Spreadsheet Clinic I have included several different ways to check the width of a print range, but this is certainly the simplest. Why didn't I think of it? A similar solution follows below.*

## PRINT RANGE RULER

The macro in Figure 2 will create a ruler you can use to find out how wide your 1-2-3, Release 2.0, print range will be. This way you will know whether your

*@repeat("a",x) where x = the margin width*

```
@repeat(" 123456789",y)
@repeat("8",y)
```

Figure 1: Formulas that help you determine how wide your print range will be.

```
\Z      {getnumber "How many characters per line? ",TEST}
LOOP    |...|.....
        {?}...|.....
        {let COUNT,COUNT+10}
        {if COUNT>=TEST}{blank COUNT}{quit}
        {branch LOOP}

COUNT

TEST
```

Figure 2: A macro that builds a ruler.

spreadsheet will fit on the page.

To use it, put the cursor in a blank row just above the left column of your print range (or in the left column of your border, if you're using one). If you don't have a blank row, use /Worksheet Insert Row to make one. Hit Alt-Z and enter the number of characters you want to print on a line. Enter the numbers 10, 20, 30, etc., whenever the macro pauses. You will see the ruler growing in the control panel. When you reach or exceed the number you gave for line length, the macro will quit and the ruler will be entered in the cell.

Once you have entered the initial line length, each time the macro pauses, you must enter a two-digit number or you will not get proper spacing. Thus, if your line length is greater than 100, enter 10 for 100, 11 for 110, 12 for 120, etc. And don't for-

get that 1-2-3 won't accept labels longer than 240 characters.

Richard Sheldon  
Tokyo, Japan

*This macro has much the same effect as the last two formulas in the previous submission (see Figure 1), except that the resulting ruler is all on one line, giving you a running total of line length.*

Further, unlike Mr. Olson's submission, Mr. Sheldon's method doesn't use a function unavailable in Release 1A. However, both methods depend on a 2.0 feature absent from 1A: Long labels that spill over into the cells to their right will still be visible even if the cell that contains them moves off the screen to the left. With 1A, long labels will disappear completely when the cell moves off the screen.

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## ■ SPREADSHEET CLINIC

### BANNER PRINTING

With a little patience, you can turn your spreadsheet into a banner printer, which prints letters like those displayed in Figure 3. The hard part is laying out the letters themselves, in "character" graphics. The technique I use is to make each letter take up one full screen, and build an alphabet in 24 successive, vertical screenfuls. When you make up banner text, PgDn is therefore the "space" key, and you can also use it to check your banner, one letter at a time, before you print it.

Once you have built your alphabet, give each letter's screenful a range name like AAA, BBB, CCC, etc. Now, return to Home in your alphabet worksheet and follow a keystroke sequence (for 1-2-3) like the one in Figure 4 to write text for a banner. This sample sequence writes the characters "AT H". When your text is ready, print the banner.

The resulting letters are about 7 inches high and fill the page nicely. If you print in compressed mode, they will be shorter. Since the letters are already composed on their sides, you don't need an auxiliary program to print sideways.

Russell Baetke  
Seattle, Washington

*Yet another use for spreadsheets!*

*It's unfortunately rather a chore to lay out the entire alphabet, but once it's done, the printed results look quite good. If I were going to print a lot of banners, I'd write a macro to do the work of Figure 4. It wouldn't be hard to write one that reads a column of letters—the text you choose for a banner—and does the repeated copy operations itself.*

### ERASING WHOLE COLUMNS

When you write 1-2-3 macros, it's often necessary to be sure that an entire column with which you plan to work is blank. This is especially true if you are going to use a function like @avg, which takes into consideration everything in a column. The obvious way to do this is to use /Range Erase, but you can use a quirk in the /Data Query Extract command to do the job better and more quickly.

If I were in cell A4, for example, and wanted to be sure that everything below row 4 in column A were completely blank,



Figure 3: Sample letters for using a spreadsheet program as a banner printer.

KEY STROKES	EXPLANATION
Page Right twice	Moves to Q1
/cAAA--	Copies the letter A into Q1.X20
PgDn	Moves to Q21
/cTT--	Copies T into Q21.X40
PgDn twice	Leaves a blank from Q41 to Q60
/cHH--	Copies H into Q61.X80
etc.	Finish your text
/PPDUU etc	Print unformatted

Figure 4: The keystrokes for making a sample banner worksheet.

I could run the macro /D shown in Figure 5. Almost instantly, everything is gone! The trick involves a data query with a blank output set. (You can, of course, get the same effect by hitting keys rather than running a macro.)

I have included r (reset) in the macro, because you never know when you might hit the Query key (F7) by mistake and once again wipe out everything from A5 on down.

Kevin Giza  
Valparaiso, Indiana

*Surprise—this actually works. The manual does say that if you have a single-row output range, all the data below it will be erased, but it takes the inspired tinkerer to*

*think of putting that quirk to good use.*

*This technique for wiping out a column of data is actually better than using the usual /Range Erase command. Most people /Range Erase a column by hitting End-Down Arrow to highlight the range. If there is a break anywhere in the column, however, they end up having to do this several times before they have highlighted the*

\D	/dq1-c-o~eq
\E	/dq1-c-o.{?}~eq

Figure 5: Macros that use data commands to erase whole columns at a time.



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## ■ SPREADSHEET CLINIC

whole column. Mr. Gaza's technique is like using the last row in the spreadsheet as the bottom limit of the range to be erased—everything goes. What's more, this technique wipes out formats as well, so you get a pristine column.

After a little fooling around, I found that you can blow away more than one column at a time. If you want to get rid of everything below cells C5, D5, and E5, say, put the cursor on C5 and run macro 'E in Figure 5. When the macro pauses, highlight D5 and E5 and press Enter. Bye-bye, three columns.

If you want to take your local spreadsheet wizard down a notch, get him to bet you \$10 that you can't erase a screenful of data from the READY state with a single keystroke. The trick, of course, is to do it once without the reset step. Now you can load the screen with data and just hit F7. Pow! It's gone, and you just earned \$10.

### HIDING MACRO SCRIPTS

In the Spreadsheet Clinic of May 27, 1986 (Volume 5 Number 10), you included a useful item on how to hide cell contents in 1-2-3. [The trick is to start a label with \ followed by as many spaces as the column is wide. The label will not be visible, nor will it spill over into blank cells to its right.—Ed.]

The same trick can be made to hide macro scripts. Start each line of the macro with \ followed by a number of spaces equal to the column width and then {esc}. The macro will be invisible.

This technique works with Release 2.0 also, but there's no need to use it in the newer product. The /Range Format Hide command does the job.

John Thompson  
Savannah, Georgia

*If you use this method to hide macro scripts, every macro line must now enter \*

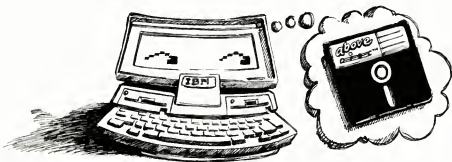
*and a series of spaces into the current cell, then abort the process with Escape. It hides the macro, all right, but it also slows execution somewhat.*

*If you do decide to write hidden macros this way, the obvious first step in simplifying the procedure is to copy the "hiding" prefix down the column of cells where you will write the macro. When you finish with one cell, go to the one below it, hit F2, and add the macro commands.*

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■ NEIL J. RUBENKING

# TURBO POWER USER



*A thorough discussion of how to modify Turbo's display screens in mono and color, determining shifted key codes, and fixing the KeyPressed function.*

## PATCHING PALETTES

If you don't like the colors that Turbo Pascal puts on your screen, you can change them if you know the locations of the attribute bytes in the program. Figure 1 gives a list of these locations for Versions 3.00B, 3.01A, and 3.02A of TURBO.COM, and Figure 2 shows how each byte represents a screen color.

Turbo Pascal distinguishes four kinds of text. The first is used for highlighted letters on menus, unmarked text in the editor, and normal output from the compiled program. Its default is bright yellow on a color monitor and it appears as intensified text on the IBM Monochrome Display.

The second type of text comprises the unhighlighted parts of menus, the top line of the screen in the editor, and the output written by a program that has called the LOWVIDEO procedure. On color monitors, this is normally low-intensity white; on the IBM Monochrome Display, it is low-intensity (normal) text.

The third type of text is the marked block, if any, within the editor. This is normally displayed at reduced intensity on either type of monitor. The fourth type of text is used only for compiler error messages.

The type you are most likely to want to change is the marked block. Since Turbo displays such blocks on a black background, you can't tell precisely where a block begins or ends if its beginning or end falls within a series of blanks. This problem can be fixed by displaying the block in reverse video or on a colored background. Figures 3 and 4 show how to use DEBUG

Type of text	IBM Monochrome Display	Color/Graphice (B&W mode)	Color/Graphice (Color mode)
HIGH	16F	173	177
LOW	170	174	178
MARKED	171	175	179
ERROR	172	176	17A

Figure 1: The hex addresses of attribute bytes used in Turbo Pascal, Versions 3.00B and later.

On the IBM Monochrome Display each byte consists of the two hex digits shown below. The first digit is the background color and the second digit is the text color.

00	invisible
01	underlined
07	normal
09	intensified and underlined
0F	intensified
70	reverse video
81	blinking and underlined
87	blinking
89	blinking, intensified and underlined
8F	blinking and intensified
F0	blinking reverse video

On the IBM Color/Graphice Adapter you combine the background and foreground values. For example, #B is intensified cyan on black, and 4E is light yellow on red.

Digit	As first digit (Background color)	As second digit (Text color)
0	Black [normal]	Black
1	Blue [normal]	Blue
2	Green [normal]	Green
3	Cyan [normal]	Cyan
4	Red [normal]	Red
5	Magenta [normal]	Magenta
6	Yellow [normal]	Yellow
7	White [normal]	White
8	Black (text blink)	Dark grey
9	Blue (text blink)	Light blue
A	Green (text blink)	Light green
B	Cyan (text blink)	Light cyan
C	Red (text blink)	Light red
D	Magenta (text blink)	Light magenta
E	Yellow (text blink)	Light yellow
F	White (text blink)	Intensified white

Figure 2: The attribute bytes used to specify text colors.

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```
debug b:turbo.com
~e 171
xxxx:0171 07.70
~w
Writing 9A80 bytes
~q
```

**Figure 3:** A suggested patch for Turbo Pascal 3.00B or 3.01A for the IBM Monochrome Display. This causes the marked block to appear in reverse video.

```
debug b:turbo.com
~e 177
xxxx:0177 0E.0b
~e 179
xxxx:0179 07.4f
~w
Writing 9A80 bytes
~q
```

**Figure 4:** A suggested patch for Turbo Pascal 3.00B or 3.01A to be used with the IBM Color/ Graphics Adapter. The patch changes normal text to cyan instead of yellow and causes the marked block to appear in white letters on a red background.

to apply the appropriate patches for the monochrome and color displays, respectively. There is nothing to prevent you from applying both patches to the same copy of TURBO.COM; the appropriate attribute bytes will automatically be used when TURBO is invoked.

The color monitor patch in Figure 4 also changes the intensified video from yellow to cyan, which is easier on the eyes on most monitors. Note that this also affects the display generated by the compiled program, even if you run it from a .COM file.

Turbo Pascal programs have the annoying habit of displaying all their output in intensified video unless you specifically ask otherwise by using a LOWVIDEO or TEXTCOLOR procedure call. You can prevent this by changing the value in locations 16F, 173, and 177 to hex 0F. If you do this, it's a good idea to also change the bytes at 170, 174, and 178 to hex 0F or perhaps 70, so that normal and "low" video remain distinct.

Robert E. Stearns, Jr.  
Michael A. Covington  
Athens, Georgia

*This is certainly the most comprehensive discussion of patching TURBO's colors I've ever seen.*

**SHIFTKEY CODES**

Some time ago (Volume 5 Number 3) you published a Turbo Pascal function that returned the scan code and ASCII code of any key on the keyboard. I wrote a companion function that returns the present status of the eight shift keys found on the IBM PC keyboard. Those keys are: Left Shift, Right Shift, Alt, Ctrl, CapsLock, NumLock, ScrollLock, and Insert.

The function GetShift returns one byte when invoked. Each bit of that byte corresponds to one shift key. This byte is maintained by the ROM BIOS and is accessed by calling interrupt \$16, function 2. The calling program then must test each bit of the returned byte to determine the current shift-states. I've included a simple test program (Figure 5) to demonstrate GetShift.

When this function is used in conjunction with the scan code function published earlier, the user gains full access to all of the keys on the keyboard for maximum control in his program.

Joe Hannah  
San Jose, California

*When you ask for current shift states with INT \$16, the result is fetched from a particular memory location. You can access that information directly, if you prefer. The adjacent byte contains more information about the shift keys.*

*The program shift\_demo, in Figure 6, uses a number of Turbo tricks to deal easily with this shift information. Not only does it enable you to READ the current state of the shift keys, it also lets you change it. This program also demonstrates a feature of the way SETs are represented in Turbo. A set is stored in from 1 to 32 bytes, with one bit for each element. Whatever the first set element may be, it is represented by the first bit. The states of the shift keys are represented by bits of the status bytes. By declaring an appropriate SET "on top" of the status bytes, using an ABSOLUTE variable declaration, we have immediate access to the shift states. As an added attraction, we also track when any shift or shift lock keys are pressed.*

*The procedure "report\_status" is called continually to update the display of shift and lock states. To check if a particular bit is set, we simply examine whether the corresponding set element is in the set.*

```

PROGRAM testshift;

FUNCTION GetShift: Byte;
TYPE
  rsgnac = RECORD
    rx, bx, cx, dx, bp, di, si, ds, es, flags: Integer;
  END;

VAR
  registers: rsgnac;
BEGIN
  registers.rx := 2 SHL 8;
  intr($16, registers);
  GetShift := Lo(registers.rx);
END;

FUNCTION GetShift;
VAR
  ch: Char;
  tmp: Byte;
BEGIN
  ch := Char;
  tmp := Byte;
  PROCEDURE OnOff(testbit: bit): Boolean;
  BEGIN
    IF (testbit AND bit) = bit THEN WriteLn('ON') ELSE WriteLn('OFF');
  END;
BEGIN
  REPEAT
    Read(Kbd, ch);
    tmp := GetShift;
    IF ch <> 'Q' THEN
      BEGIN
        WriteLn(ch);
        Write('Insert '); OnOff(tmp, 128);
        Write('Caps Lock '); OnOff(tmp, 64);
        Write('Num Lock '); OnOff(tmp, 32);
        Write('Scroll Lock '); OnOff(tmp, 16);
        Write('Alt Shift '); OnOff(tmp, 8);
        Write('Ctrl Shift '); OnOff(tmp, 4);
        Write('Left Caps Shift '); OnOff(tmp, 2);
        Write('Right Caps Shift '); OnOff(tmp, 1);
      END;
    UNTIL ch = 'Q';
  END;
END.

```

Figure 5: This program tests the shift states by calling *intr* on \$16.

```

[SC-]
PROGRAM shift_demo;
[by Neil J. Rubenking]
TYPE
  stat1 = (rx_press, ln_press, ctrl_press, alt_press,
    scroll_lock, num_lock, caps_lock, ins_lock);
  stat2 = (dummy1, dummy2, dummy3, dummy4,
    scroll_press, num_press, caps_press, ins_press);
VAR
  status: SET OF stat1 ABSOLUTE $0040: $0017;
  status2: SET OF stat2 ABSOLUTE $0048: $0018;
  ch: Char;
  s: STRING[64];
  PROCEDURE report_status;
  VAR
    sVar1: stat1;
    sVar2: stat2;
  BEGIN
    FOR sVar1 := rx_press TO alt_press DO
      BEGIN
        GoToXY(15, 6+2*Integer(sVar1));
        IF sVar1 IN status THEN Write('XXXX') ELSE Write(' ');
      END;
    FOR sVar1 := scroll_lock TO ins_lock DO
      BEGIN
        GoToXY(33, 6+2*Integer(sVar1));
        IF sVar1 IN status THEN Write('XXXX') ELSE Write(' ');
      END;
    FOR sVar2 := scroll_press TO ins_press DO
      BEGIN
        GoToXY(15, 6+2*Integer(sVar2));
        IF sVar2 IN status2 THEN Write('XXXX') ELSE Write(' ');
      END;
    END;
  PROCEDURE Make_Chart;
  BEGIN
    (continues)
  END;

```

Figure 6: This alternative program tests shift states by examining memory locations directly.

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## ■ TURBO POWER USER

```

TextColor(White); TextBackground(Black);
ClrScr;
GoToXY(10, 1); Write('SHIFT status report:');
TextColor(Black); TextBackground(White);
GoToXY(10, 2); Write('Press shift and lock keys. [Q] to Quit.');
```

GoToXY(10, 4); Write(' press ++KEY NAME++ lock');

GoToXY(20, 6); Write('Right Shift');

GoToXY(20, 8); Write('Left Shift');

GoToXY(20, 10); Write('Ctrl Shift');

GoToXY(20, 12); Write('Alt Shift');

GoToXY(20, 14); Write('Scroll Lock');

GoToXY(20, 16); Write('Num Lock');

GoToXY(20, 18); Write('Caps Lock');

GoToXY(20, 20); Write('Insert');

GoToXY(5, 23); Write('NOTE: You cannot use the INS key when ');

Write('the NUM LOCK is on!');

END;

```

BEGIN
  CH := 'S';
  MakeChrt;
  REPEAT
    IF KeyPressed THEN Read(Xbd, CH);
    report_status;
  UNTIL UpCase(CH) = 'Q';
  TextColor(White); TextBackground(Black);
  ClrScr;
  status := [];
  WriteLn('Whatever the keys you pressed, I just turned off ALL the locks!');
  Write('Type something: '); ReadLn(S);
  WriteLn;
  status := [Caps_Lock, Num_Lock];
  WriteLn('I just turned caps and num lock ON -- try the keypeds, too.');


Write('Type something: '); ReadLn(S);



WriteLn;



status := [];



END.


```

(Figure 6 ends)

Pascal's **INLINE** statement to call a DOS function. It guarantees only one keystroke. A test program is shown in Figure 7. In this program the new function is called **PressKey**, so you can use Turbo's original function for comparison.

Victor Zhuo  
Sacramento, California

*PressKey was originally a function. However, since it always waited for a key to be pressed, it could not be used simply to test*

■ **PressKey** could not be used simply to test for a key waiting. Therefore, I changed it into a procedure that is the equivalent of "REPEAT UNTIL KeyPressed"

*for a key waiting ('IF KeyPressed THEN ...'). Therefore, I changed it into a procedure that is itself the equivalent of "REPEAT UNTIL KeyPressed". Note that a slight variation on this procedure will first CLEAR the keyboard buffer and then wait for a key to be pressed. To make this last change, you simply have to comment out the line marked {A} and then make sure to uncomment the line that is marked {B}.*

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*Neil J. Rubenking is a professional Pascal programmer.*

```

PROGRAM Test_PressKey;
{$U+}

PROCEDURE PressKey;
BEGIN
  INLINE(
    $50; { PUSH AX }
    $B4/$87; { MOV AH,07 } {A}
    (* $B8/$87/$8C; { MOV AX,$C07h }*) {B}
    $CB/$21; { INT 21 }
    $50; { POP AX }
  );
END;

BEGIN { Main program }
  Write('Press any key...');
  REPEAT UNTIL KeyPressed;
  WriteLn; WriteLn('ONE key stroke? Only when you're lucky.');


Write('Press any key...');



PressKey;



WriteLn; WriteLn('Definitely only ONE key stroke!');



WriteLn('Waiting for another key stroke...');



PressKey;



WriteLn('That is it!');



END.


```

Figure 7: A wait-for-keypress procedure that works properly with the {\$U+} compiler directive.

What looks like a call to a function "INTEGER" is really a use of Turbo's "RETYPE" facility. **INTEGER** returns the integer (starting with 0) corresponding to the position of the argument in its own enumerated type. Thus, "INTEGER(rs.press)" equals 0, and so on.

#### A PRESSING CONCERN

In using Turbo Pascal, I found that the function **KeyPressed** does not work consistently when used with compiler directive {\$U+}, **UserBreak Active**. The trouble is found in both Versions 2.0 and 3.0. I redefined this function by using Turbo

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## ■ PAUL SOMERSON

# USER-TO-USER



*A utility to reset the AT's on-board clock, instructions for running the internal hard disk formatter, and a patch to give you true batch file variables.*

## BETTER SETTER

The lithium battery on my AT is starting to fail. When I turn it on, I get the right date but the wrong time. I'm going to order a replacement from International Battery Corp., as reported in First Looks (page 44, *PC Magazine*, Volume 5 Number 18). But until I do, I have to set the time whenever I power up.

If I restart with Ctrl-Alt-Del, which I do all too often during program development, the BIOS reads the wrong time from the AT clock and I'm back where I started. I can set the clock with the setup program from the Guide to Operations diskette, but that is very cumbersome.

To solve this problem, I wrote a small program called SETCLOCK.COM that reads the current time and date from DOS and uses these values to update the AT's clock.

To create SETCLOCK.COM, either assemble the SETCLOCK.ASM source code in Figure 1, run the BASIC SETCLOCK.BAS program in Figure 2, or use a pure ASCII word processor to type in the SETCLOCK.SCR script in Figure 3 and then redirect it into DEBUG's mini-assembler with the command

DEBUG < SETCLOCK.SCR

Arthur Rothstein  
San Francisco, California

*This short but very useful utility comes in awfully handy in the fall and spring when the time changes backward or forward an hour. IBM and Microsoft should have made it easier to reset the time without*

```
.286c                                yellow 80286 nonprotected instructions

CONVERT MACRO ARG1,AX
        XCHG ARG1,AX
        CALL BCDCHV
        XCHG ARG1,AX
        ENDM

CSEG SEGMENT PARA PUBLIC 'CODE'
        ASSUME CS:CSEG
        ORG 1000
START PROC FAR
        MOV AX,0FFFFH           ;check the CPU model
        MOV DS,AX
        CMP BYTE PTR [DS:0000],0F0H ;is this an A77
        JNE ERROR              ;skip if no

        MOV AH,2AH              ;DOS get date function
        INT 21H
        XCHG CX,AX
        MOV BL,100
        DIV AH,AL
        XCHG CX,AX
        CONVERT CX
        CONVERT CX
        MOV AH,5
        INT 1AH
        MOV AH,2CH
        INT 21H
        CONVERT CX
        MOV DL,0
        CONVERT DX
        MOV AH,3
        INT 1AH

        MOV AL,0                ;return code
EXIT:   MOV AH,4CH
        INT 21H                ;return to DOS with result code
        ;call DOS, do not return

ERROR:  MOV DX,OFFSET MSG
        MOV AH,9
        INT 21H
        MOV AL,1
        JMP EXIT
START ENDP

; Routine BCDCHV: Convert a binary number to binary coded decimal
; Entry: Two binary numbers, one in AH, the other in AL
; Exit: AH and AL are each converted to BCD
; Registers used: BL

BCDCHV PROC NEAR
        MOV BL,AH
        AAM
        SHL AH,4
        ;save the high order argument
        ;convert AL to BCD
        ;shift quotient left by 4 bits
        ;(continues)
```

Figure 1: SETCLOCK.ASM assembler source code.

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## ■ USER-TO-USER

```

OR      AL,AR           ;combine into a single BCD byte
XCHG    AL,BL           ;exchange low order result with high order erg
ROR     AL,4            ;convert AL to BCD
ROR     AH,4            ;shift quotient left by 4 bits
OR      AL,AL           ;combine into a single BCD byte
MOV     AH,BL           ;retrieve the low order result
RET     ;return to caller

BCDQW   ENOP

XSG     DB              'CPU is not an AT!'

CBEG    BHOS
        ENO            START
    
```

(Figure 1 ends)

```

100 ' Program for creating SETCLOCK.COM -- Arthur Rothstein
110 CL:PRINT "Checking DATA; please wait..."
120 FOR B=1 TO 7:FOR C=1 TO 17:READ A$:IF C=17 THEN 140
130 S=S+VAL(A$)
140 NEXT:PRINT
150 IF S=13580 THEN RESTORE:GOTO 100
160 PRINT "ERROR: CHECK THE LAST NUMBER IN"
170 PRINT "EACH DATA STATEMENT--THEN REDO":ENO
180 FOR B=1 TO 7:FOR C=1 TO 16:READ A$:TTL=TTL+VAL("A"+A$)
190 NEXT
200 READ S:IF S=TTL THEN 220
210 PRINT "DATA ERROR IN LINE";B*16+268; -- REDO*:ENO
220 TTL=0:NEXT:RESTORE
230 OPEN "SETCLOCK.COM" AS #1 LEN=:FIELD #1,1 AS OS
240 FOR B=1 TO 7:FOR C=1 TO 16:READ A$:
250 LSET OS=CHR$(VAL("A"+A$)):PUT #1:NEXT:READ DUMMYS:NEXT
260 LSET OS=CHR$(36):PUT #1:CLOSE:PRINT "SETCLOCK.COM CREATED"
270 DATA BB,FF,FF,8E,D8,88,3E,8E,8E,FC,75,34,B4,2A,CD,21,2137
280 DATA 91,83,64,76,F3,86,E8,91,91,8E,2F,88,91,92,E8,2A,2485
290 DATA 88,92,84,85,CD,1A,B4,2C,CD,21,91,E8,10,88,91,82,1753
300 DATA 88,92,E8,16,88,92,84,83,CD,1A,88,88,84,4C,CD,21,1638
310 DATA BA,68,81,B4,89,CD,21,88,81,E8,F1,8A,DC,04,8A,CB,2135
320 DATA B4,84,8A,04,86,C3,04,8A,CB,8E,84,8A,E8,8A,C3,2175
330 DATA 43,55,28,69,73,28,E8,6F,74,28,61,6E,28,43,24,1273
    
```

Figure 2: BASIC SETCLOCK.BAS file that creates SETCLOCK.COM program to set clocks permanently (on ATs only).

```

E 100 BB FF FF 8E D8 88 3E 8E 8E FC 75 34 B4 2A CD 21
E 110 91 83 64 76 F3 86 E8 91 91 8E 2F 88 91 92 E8 2A
E 120 88 92 84 85 CD 1A B4 2C CD 21 91 E8 10 88 91 82
E 130 88 92 E8 16 88 92 84 83 CD 1A 88 88 84 4C CD 21
E 140 BA 68 81 B4 89 CD 21 88 81 E8 F1 8A DC 04 8A CB
E 150 B4 84 8A 04 86 C3 04 8A CB 8E 84 8A E8 8A C3 C3
E 160 "CPU is not an AT"

RCK
71
N SETCLOCK.COM
N
Q
    
```

Figure 3: SETCLOCK.SCR script that creates SETCLOCK.COM program to set clocks permanently (on ATs only). Type this in using a pure ASCII word processor, then put it on the same disk as any version of DEBUG.COM or later and type DEBUG < SETCLOCK.SCR.

having to drag out the setup disk and then wade through all the other configuration questions, and this does the trick neatly. To use it, set the time with the DOS TIME command, then just type SETCLOCK to make it stick. Remember, this was designed to work on IBM ATs only.

### PLAYING WITH FIRE

If you've installed third-party hard disks driven by Western Digital controller cards (ROM Version 6.0 or earlier) and either wish to experiment or did not receive adequate instructions on how to low-level-

format your hard disk, it's easy to do so.

The following procedures will also let you change the drive designation and the interleave if you so desire. (Make sure this is what you want!)

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### RAX

When DEBUG responds with a ":", enter the drive designation and the interleave you want. For example, for a hard disk designated as drive D: with an interleave of 4 you would enter

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### PRODUCTIVITY

#### ■ USER-TO-USER

0104

since drives are designated 0 through 7 with drive C: equal to 0. (The relative drive number goes into register AH, and the interleave factor into AL.)

Then, at the DEBUG prompt, enter

G=C800:5

Answer "Y" to the question on-screen if you wish to begin low-level formatting.

Finally, use FDISK and FORMAT to complete the setup of your newly configured drive. Remember, this will erase all information already on your hard disk.

Gordon L. Sato  
Lewisville, Texas

*The only time to try this is when you're first installing a hard disk or when you're absolutely currently backed up. If you do experiment, make sure you note the default settings so you can reset everything to normal when you're done. You obviously will know what the original drive number is, and the low-level formatter should print out the interleave factor in its prompt. And, this won't work on all systems.*

#### REAL BATCH VARIABLES

DOS can use replaceable parameters in batch files but has no way to turn replaceable parameters into true variables, so I devised one—for DOS 3.1 only.

Create the INPUT.SCR DEBUG script below using the DOS COPY CON command or any pure-ASCII word processor. Be sure to leave a blank line after RET and hit the Enter key after each line, especially the final one.

```

S: COMMAND.COM
L
A 246E
MOV SI,3C82
INC CX
SUB [SI],CL
MOV DX,SI
MOV AX,0CBA
INT 21
INC SI
DEC DI
LODSB
MOV CL,AL
INC CX
HLT MOVSB
CALL 250F
JMP 270F

E 409B "INPUT",02,2E,11
L 4CDB 49
E 4C4D 49
E 4A4E "3,1",00,00,00,00,00,00
H ALTCON.COM
W
G
    
```

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## ■ USER-TO-USER

Then make sure DEBUG.COM is on your disk, or that you've pathed to it, and type

```
DEBUG < INPUT.SCR
```

This will create a modified version of COM-MAND.COM called ALTCOM.COM. ALTCOM.COM uses the space originally taken up by the VER and RMDIR commands and replaces these with a new INPUT command. (You'll still be able to use RD to remove subdirectories, but not RMDIR. And VER will be missing a space or two, as well as its trailing carriage return.)

The syntax for INPUT is

```
INPUT variable
```

When DOS sees the INPUT command in a batch file, it will wait for input from the keyboard. This information will then be placed in the DOS environment for the batch file to use.

To see this in action, create the following TEST.BAT batch file (remember, this works in DOS 3.1 only):

```
ECHO OFF
CLS
:LOOP
ECHO COMMAND?
INPUT CMD=
IF %CMD% == 1 GOTO LOOP
IF %CMD% == STOP GOTO END
IF %CMD% == stop GOTO END
%CMD%
GOTO LOOP
:END
```

Before you try it, however, install your new command processor by typing in ALTCOM at the DOS prompt. Then run the batch file. To get out of the batch file just type STOP (or stop).

The number of variables you can use is limited only by the amount of environment space you have. If you like this, you can rename ALTCOM.COM to COM-

MAND.COM and use it to replace your old command processor.

If you type

```
SET <parameter1>=<parameter2>
```

■ DOS has no way to turn replaceable parameters into true variables, so I devised one—for DOS 3.1 only.

and the name of parameter1 is longer than the environment space. DOS responds with an "Out of environment space" error. This is fine but when you type SET to

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## The Product Market

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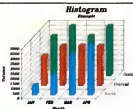
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- Geographic location
- Demographic description of purchasers

### Behavioral Characteristics of Purchasers

- When purchases are made
- How buying is done
- Purchasing influences

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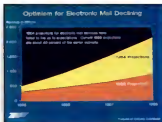
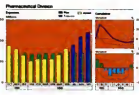
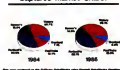


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## ■ USER-TO-USER

find out what you have in the environment, you find the environment contains part of the name of parameter1. Also you can no longer set anything else into the environment unless you erase something previously put in. Besides, there is no way of removing that string short of restarting the computer.

James M. Bachstein  
Crescent Springs, Kentucky

*Lately we've been reluctant to publish COMMAND.COM patches, but this one is interesting, even though it mangles some existing commands. DOS batch files are*

■ The number of variables you can use is limited only by the amount of environment space you have.

powerful tools, but users sorely miss this kind of interaction. The sample TEST.BAT file above lets you execute interactive DOS commands on the fly or pass parameters all around your system.

If you try this, remember you have to load ALTCOM.COM as a secondary command processor to make it work (type EXIT to return to your original COMMAND.COM when you're done). And it's for Version 3.1 only.

Finally, in 3.2, you can set environment size, using a IE COMMAND.COM switch. And if you're running short of space in your environment, you can always use the SUBST command to shorten your paths, which are the big space hogs.

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## ■ CHARLES PETZOLD

## PC TUTOR



*Using ANSI.SYS to redefine keys and color your display, and a QuickBASIC solution to accessing the command line from within BASIC programs.*

## COLOR ME DOS

I have an IBM PC AT and can't seem to find a local computer dealer who can show me how to put some color on my display while on the DOS command level. Any suggestions?

Bob Baker

South Yarmouth, Massachusetts

*Questions about color seem to come in waves to the PC Tutor mailbox. It's been a while since I last discussed the subject, so maybe it's time again.*

*The most hassle-free method of getting some color on the DOS command level is by using ANSI.SYS and the PROMPT command. The prompt is the thing that normally looks like*

C>

*and the PROMPT command lets you change it.*

*ANSI.SYS is a device driver that comes with DOS. You can instruct DOS to load ANSI.SYS by adding the following line in your CONFIG.SYS file:*

```
DEVICE=ANSI.SYS
```

*If you don't have a CONFIG.SYS file, you can create one with EDLIN. If you keep ANSI.SYS in a subdirectory (called DOS, for instance), the line would read*

```
DEVICE=DOS\ANSI.SYS
```

*The next time you reboot, ANSI.SYS will be loaded.*

*Now, with ANSI.SYS loaded, enter*

```
PROMPT $e[35;44;1m9p9g$e[33;44;1m
```

*This gibberish creates a magenta prompt and yellow text on a blue background. You can color the whole background blue by executing a CLS (clear screen) command. If you're fond of that color combination, you can put this line in a file called AUTOEXEC.BAT in your root directory. If you don't have an AUTOEXEC.BAT file, you can create one with EDLIN, as well.*

*The ANSI.SYS device driver allows applications programs to control the video display using control sequences standardized by the American National Standards Institute (ANSI). PC applications programs that actually use ANSI control sequences, however, are very rare. Most applications programs control the display in other ways.*

*The ANSI.SYS control sequences are not documented in the DOS manuals for Versions 2.1 or later. They can be found in*

*the DOS Technical Reference manual, which IBM sells for the outrageous price of \$150. The remainder of the DOS Technical Reference manual is essential for assembly language programmers, useful for other programmers, and a waste for people who don't need (or want) to know about the internals of DOS.*

*All the ANSI control sequences begin with an escape character (hexadecimal 1Bh) and a left bracket. The Sx used in the PROMPT command is the code that PROMPT uses for an escape character. The control sequences to control color end with the letter m. Between the left bracket and the m is a series of numbers separated by semicolons. These numbers specify the color. They are listed in Figure 1.*

*A number 1 following a background and foreground number turns on high intensity for the foreground. This is generally necessary for text on a colored background. A high-intensity brown is yellow.*

*The SpSg in the PROMPT command is the non-ANSI part of the prompt. As you can note from the documentation of PROMPT in the DOS manual, this is a good prompt for a hard disk user, since it shows you both the current drive and directory.*

*Another popular method for coloring the display uses BASIC. You can create a small BASIC program (called, for instance, COLOR.BAS) that looks something like this:*

```
10 COLOR 14,1
20 CLS
30 SYSTEM
```

Color	Foreground	Background
Black	30	40
Red	31	41
Green	32	42
Brown	33	43
Blue	34	44
Magenta	35	45
Cyan	36	46
White	37	47

**Figure 1:** Foreground and background colors you can set with the PROMPT command, using ANSI.SYS.

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## ■ PC TUTOR

Then, when you execute

BASICA COLOR

you'll be back on the DOS command level with yellow text on a blue background. (The color codes used in BASIC are documented in the BASIC manual under the COLOR statement. Naturally, they are entirely different from the ANSI.SYS color codes.) You could put the line BASICA COLOR in a batch file called C.BAT. Then, just executing C will set your colors.

I prefer the ANSI and PROMPT method to the BASIC method. It's a little more complex at first, but once done you don't have to fuss with it. Many applications programs reset the video mode and clear the screen when they start up. So, after you get out of these programs, you'd have to execute the COLOR program again. With the ANSI and PROMPT method, you don't have to do anything.

If you use the BASIC program rather than the PROMPT command for setting your colors, do not load ANSI.SYS. ANSI.SYS will use its default color values (gray on black) instead of those that BASIC sets.

## ANOTHER ANSI SOLUTION

For the longest time, I've been trying to figure out a way to execute the command line "DIR /P" by hitting an Alt-D on the keyboard. I've been through all the manuals I can find and about a dozen issues of PC Magazine, but I still can't find the answer. Can it be done?

Clayton Siem  
(Address withheld)

Sure. In the question immediately above, you saw how to use ANSI.SYS to color the display. You can also use ANSI.SYS to redefine the keyboard. If you've loaded ANSI.SYS, you can include the following statement in your AUTOEXEC.BAT file:

```
ECHO <Esc>[0;32;"DIR /P";13p
```

The <Esc> in that line doesn't mean the characters <, E, s, c, and >. It means the ASCII escape character must be there. The escape character is a difficult character to enter in many text editors. It's fairly easy in EDLIN, however: you type a Ctrl-V followed by a left bracket.

So, when typing in the line in EDLIN, you would actually type: ECHO, a space, a Ctrl-V, a left bracket, another left bracket, a D, and so forth.

The 0;32 means that we're defining an extended keyboard key that has a code of 32. That's the Alt-D combination. (These extended keyboard codes are defined in the Technical Reference manual for the PC, XT, and AT, not in the DOS Technical Reference manual where ANSI.SYS is discussed.) The 13 means a carriage return, and the p at the end identifies the control sequence as a keyboard redefinition.

In this example, you can't use \$e to represent the escape character because that's something only the PROMPT command understands. However, you can use the PROMPT command instead of ECHO for redefining the keys, as the next gentleman does.

## AND AN ANSI PROBLEM

Recently I decided to redefine my function keys to perform some common tasks with ANSI.SYS and the PROMPT command. This is how I set up the commands in my AUTOEXEC.BAT file:

```
PROMPT $e[0;65;"DIR";13p
PROMPT $e[0;66;"DIR /W";13p
PROMPT $e[0;67;"DIR /P";13p
PROMPT $e[0;68;"CLS";13p
PROMPT $e[33;44m;n5g$e[36;44m
```

The first four PROMPT commands redefine the function keys F8 through F10. The last PROMPT command sets the prompt to brown-on-blue and the text to cyan-on-blue.

Whenever I rebooted, every command flashed up on the screen. This annoyed me so I added ECHO OFF preceding the PROMPT commands. To my surprise, it prevented the PROMPT commands from executing. My keys were not redefined. Why is this happening?

Robert E. Schneider  
Thrumbull, Connecticut

ANSI.SYS is a video display driver. It will interpret a control sequence only if some program makes an attempt to display the control sequence on the screen. ANSI.SYS doesn't put the control sequence on the screen because it recognizes it as a command to do something (in this case, to re-

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## ■ PC TUTOR

define a key) rather than displayable text.

When **COMMAND.COM** executes your batch file, then, the line with the first **PROMPT** command is displayed on the screen. You'll see the whole **PROMPT**

command just as you've typed it because that's not the control sequence. An **ANSI** control sequence begins with an escape code and the **PROMPT** argument begins with a **\$**. **COMMAND.COM** then ex-

ecutes this **PROMPT** command, which sets a new prompt.

Next, **COMMAND.COM** displays the new prompt, followed by the next line in the batch file. As it displays the new prompt, **COMMAND.COM** replaces the **\$** with an escape code. That makes the new prompt an **ANSI** control sequence. You won't see the new prompt on the screen because **ANSI.SYS** interprets it as a command to redefine a key.

When you use **ECHO OFF**, **COMMAND.COM** doesn't display the prompt for each line it executes. If it doesn't display these prompts, **ANSI.SYS** never sees them. Thus, the keys don't get redefined.

If you want to use **ECHO OFF**, use an **ECHO** command instead of **PROMPT** for the first four lines and replace the **\$** with an escape code, as shown in the letter above.

Alternatively, you can place all the **ANSI.SYS** key redefinition control sequences in a separate file (call it **KEY.DAT**) that looks like this:

```
<Esc>[0:65:"DIR":13p
<Esc>[0:66:"DIR"/W":13p
```

and so forth. You can even put them all on one line if you want. Then, in your **AUTOEXEC.BAT**, you can display this file to the screen (and have **ANSI.SYS** redefine the keys) by the command

**TYPE KEY.DAT**

If you've done it right, you won't see the **KEY.DAT** file.

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## PRODUCTIVITY

### ■ PC TUTOR

Microsoft's recent QuickBASIC 2.0 compiler includes a function called **COMMANDS** that returns the command line both stripped of leading blanks and capitalized. This is just one of several noteworthy enhancements in QuickBASIC 2.0 that are not found in BASIC. QuickBASIC 2.0 is so inexpensive and easy to use that BASIC and BASICA interpreters are now obsolete. You don't lose "quick and easy program development," because QuickBASIC 2.0 includes a built-in editor and in-memory compilation.

Without **COMMANDS**, getting access to the command line from within a BASIC program is not an easy task. Whenever DOS executes a .COM or .EXE program, it must build a Program Segment Prefix (PSP) in memory immediately preceding the program. DOS places the command line in the PSP beginning at offset &H81. The byte at offset &H80 indicates the number of bytes contained in the command line. A carriage return is included at the end of the command line, but this carriage return is not included in the count.

If you knew the segment address of the PSP, you could use **DEF SEG** and **PEEK** to fish out the bytes. When DOS passes control to an executing program, the segment address in register **DS** points to the PSP. Assembly language programs can access the command line parameter, but the PSP segment address is not directly available within a compiled program.

In DOS 3.0 or later, DOS interrupt 21h, function call &H62, returns the PSP address of the currently executing program in register **BX**. (An undocumented function call &H51 does the same thing in DOS 2.0 or later.) Making DOS function calls within BASIC programs presents a number of other problems, however. [See Ethan Winer's Lab Notes, "Interfacing BASIC and Assembler," *PC Magazine*, Volume 5 Numbers 21 and 22.—Ed.] QuickBASIC 2.0 solves this problem by implementing a reasonably easy method of calling software interrupts.

### ASK THE TUTOR

The PC Tutor solves practical problems and explains points of general interest. To see your questions answered here, drop a line to PC Tutor, *PC Magazine*, One Park Avenue, New York, NY 10016. ☐

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\*Starch Study, July 1986

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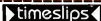
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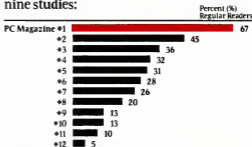
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## COMING UP

**HAL: A 1-2-3 BREAKTHROUGH** Although its name is derived from the sinister computer of cinematic fame, nothing could be friendlier than **HAL**, Lotus's English-speaking 1-2-3 interface. Endless chains of slash commands and macros are replaced with simple English phrases, and **HAL** will even show you the macros that lie behind your request. Charles Petzold gives this amazing interface a test run.

**CHEAP WORD PROCESSORS** A word processing program for less than the cost of a hardcover book? That's right. And, in fact, for \$89 you can get features you would have paid hundreds of dollars for less than 2 years ago. As software prices tumble, word processors are leading the way, and in this review several word processing experts examine 18 popular programs priced from \$14.95 to \$199.

**DOS SHELLS** New versions of several DOS-enhancing utilities are faster and smarter than ever, but some PC users contend that attempting to improve the DOS interface is more confusing than just leaving DOS alone. Vincent Puglia and Jon Pepper look at 19 DOS shells in search of the best way to get the most out of DOS and its organizational capabilities.

**80286-BASED XTs** The Tandy 3000 HD may have defined this class of machine, but it was the IBM PC-XT Model 286 that made the biggest splash. Now ALR, ITT, and AT&T all offer XT compatibles with AT-style 80286 microprocessors. Winn L. Rosch investigates.

**COMMUNICATIONS SECURITY** Howard Marks reviews the Anderson Jacobson AJ 2412-AD3H modem and the Cermetek Security Modem, two hardware solutions for security problems that have traditionally been addressed by communications software. Both modems make strong security easier to achieve than ever before.

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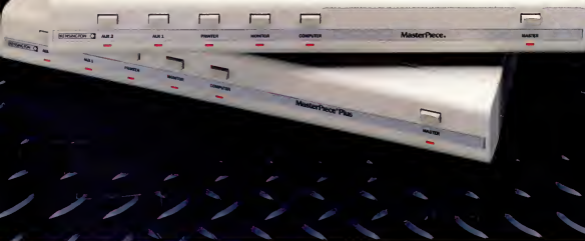
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